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ABSTRACT

The National 4-H Wildlife Invitational is a competitive event to teach youth about the fundamentals of wildlife management. Youth learn that management for wildlife means management of wildlife habitat and providing for the needs of wildlife. This handbook provides information about wildlife habitat management concepts in both urban and rural settings and prepares participants for judging events. The contents and activities in the handbook are arranged in six sections in the order used by wildlife managers when deciding how to manage areas for specific wildlife species. The introduction describes how to use the handbook, preparing for contests, and general contest rules and guidelines. The second section defines 11 basic concepts on which the contest is based. The third section separates the country into 14 regions having similar climate, vegetation, and wildlife for use in the contest. The fourth section discusses habitat requirements and practices useful for managing habitat for the birds, mammals, and other species listed in the Regions section. The fifth section lists alphabetically 43 practices used to manage habitat. A general description of each practice and its effect on habitat are provided. The sixth section describes the five activities in which each contestant is expected to participate. Additional information includes criteria for scoring the contest, and a glossary of 71 terms. Contains 55 references. (MDH)

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Wildlife Habitat Evaluation Handbook

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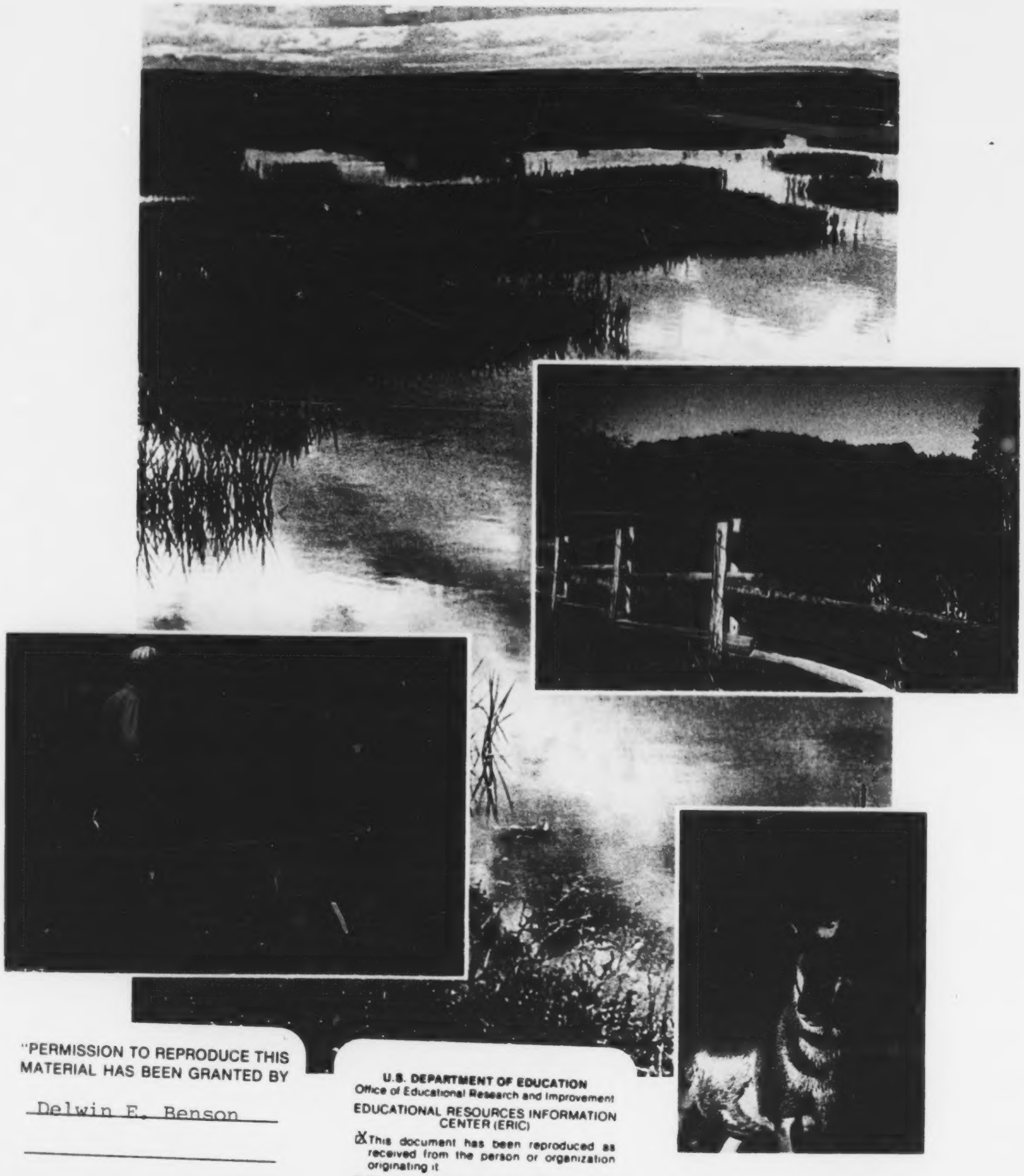

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May 1991, revised November 1991

The National Wildlife Habitat Evaluation Project

The Wildlife Habitat Evaluation Program represents the evolution of interest and work of many Cooperative Extension professionals and volunteers. The program had its beginnings when Drs. Jim Byford and Tom Hill of the Tennessee Agricultural Extension Service initiated the Wildlife Judging Project in Tennessee. With support from the U.S. Fish and Wildlife Service, a conference was held in 1985 to explore the possibility of a Southern Region program. The first Southern Invitational was held in 1987. In 1988 the second Southern Invitational was supported by the International Association of Fish and Wildlife Agencies and a conference was held concurrently to discuss the possibility of a national event. In 1989 the first national event was held with the support of the U.S. Fish and Wildlife Service and the International Association of Fish and Wildlife Agencies.

In 1990-91 the program was expanded nationally and this handbook was produced with sponsorship by Champion International Corporation and the U.S. Fish and Wildlife Service. The handbook incorporates the basic concepts originated by Dr. Byford with the addition of landscape regions from throughout the United States, urban activities, and a wider array of habitat management practices and wildlife species to manage.

This handbook is for you to use in local programs and to prepare for the annual National Invitational Contest. It is the intent of the organizers to move the national contest to different locations each year. The location of the next national contest will be announced at this year's national contest. States without a wildlife habitat judging program are encouraged to prepare over the summer through local contests and to send a delegation to the national contest. This handbook is designed to provide uniformity for the national program and contests throughout future years. The management techniques that are recommended provide the generalized state-of-the-art for wildlife and habitat management using representative species occupying major habitats in the United States. In local and state programs and contests, you may have to modify region descriptions, wildlife species, and management techniques.

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Introduction

The National 4-H Wildlife Invitational is an event designed to teach youth about the fundamentals of wildlife management. Although it is a competitive event, its primary function is education. Natural resources management is learned through participation in the contest and the associated programs. Additional benefits come from the development of leadership capabilities and meeting youth and professionals from other states.

In this program, youth will learn that management for wildlife means management of wildlife habitat and providing for the needs of wildlife. The information found in this handbook is provided for learning wildlife habitat management concepts in both urban and rural settings and to prepare participants for judging events. The handbook and activities are not only focused on increasing knowledge in the wildlife management field, but also in developing skills in applying learned knowledge. The Invitational addresses these concepts with the five activities below.

1. Identify common wildlife foods.
2. Interpret wildlife habitat from aerial photographs.
3. Prescribe wildlife management practices.
4. Develop a rural wildlife management plan.
5. Develop an urban wildlife management plan.

The contents and activities in the handbook are arranged in the order used by wildlife managers when deciding how to manage areas for specific wildlife species. Before making recommendations on habitat management, one must know all possible information about the life requirements of the specific animal(s) for which the area is being managed. The *Concepts*, *Wildlife Species*, and *Foods* sections of this handbook can help participants learn the life requirements of some wildlife.

Next, the manager must be able to inventory and evaluate the present condition of the habitat and explain the condition to landowners and other interested parties. The aerial photography section is designed to develop understanding of this inventory and evaluation process.

Once the inventory is complete, the manager decides which management practices can be applied to improve the habitat for specified wildlife species. The on-site management recommendation activity gives the participant some experience with this decision making effort.

Finally, so that others can clearly understand the proposed management decisions, the wildlife manager must explain the decisions on paper and locate them on aerial photos or some other type of map. The urban and rural management plan activities encourage participants to explain and illustrate their decisions so that others can understand and carry out the recommendations.

About the Handbook

The handbook is divided into the following major sections:

1. *Wildlife Habitat Concepts* introduces the 4-H'er to basic wildlife management principles. These concepts are the basis for the remainder of the handbook.

2. *Regions* identifies areas of the United States with distinctly different habitats and wildlife. This section gives a brief description of the habitats found in the regions, explains typical stages of plant succession, lists wildlife species to be used in national events and summarizes habitat management practices that can be used for species in each region.

3. *Wildlife Species* provides information about habitat requirements and practices used in managing habitat for the various species.

4. *Wildlife Management Practices* explains the management practices discussed in the *Wildlife Species* section.

5. *Wildlife Foods* has information about foods that wildlife use.

6. *Interpreting Wildlife Habitat From Aerial Photography* explains how to evaluate wildlife habitat using aerial photographs. Examples of ranking photographs and measuring interspersion are included.

7. *Wildlife Management Plan* explains how management plan exercises will be carried out.

8. *Urban Landscapes and Backyard Habitat Plans* discusses how to apply wildlife management principles to urban environments and outlines an activity for use in an urban area. Materials for practicing the activity are included.

9. *Glossary* defines some of the technical words used in the handbook.

10. *Bibliography* lists the sources that were used in development of the handbook. Sources that are likely to be found in local libraries and that may be useful as additional teaching material are shown in bold type.

In the *Activities* section, outlines can be found of activities and scorecards that will be used in the national contest. The five activities are listed below:

Activity I.	Wildlife Foods.
Activity II.	Habitat Evaluation From Aerial Photographs.
Activity III.	On-site Habitat Management Recommendations.
Activity IV.	Wildlife Management Plan.
Activity V.	Urban Landscapes and Backyard Habitat Plans.

These are examples only and may need modification for local and state events. In national events all of the activities and scorecards will be used as printed specifically for the region(s), species, and management techniques in this handbook.

How to Use the Handbook

Leaders and participants should first locate and mark the materials that are pertinent to the region(s) they are studying. The basic steps are:

1. Determine which region(s) to use. This may be where participants live, or other areas where local, state, or national contests are going to be held. Maps and region descriptions found in the *Regions* section can be used when making this decision. The Wetlands and Urban Regions are applicable to all regions.

2. Determine which wildlife species will be used. A list of recommended species accompanies the description of each region.

3. Locate and mark the selected species in the *Wildlife Species* section of the handbook. Read the species information and identify the recommended habitat management practices.

4. Locate and mark the appropriate management practices in the *Wildlife Management Practices* section.

5. Using the above steps, leaders and participants should be able to find all of the information needed for Activities II through V. Specific guidance and practice examples for Activities II and V can be found in the *Aerial Photograph* and *Urban Landscape* sections respectively.

6. All of the information needed for Activity I can be located in the *Wildlife Foods* section. In the national contest, any of the wildlife and food groups found in this section may be used. Regardless of the region(s) you are using, all of the information in this section should be learned.

Preparing for Contests

Participants should first read and understand the *Concepts* section of the handbook. Leaders should explain the concepts to 4-H'ers and when needed, provide local examples to clarify any misunderstandings. This section is important because many of the activities require understanding of the concepts.

Once the concepts are understood, the leader should review the appropriate regional information with the participants. Leaders have the flexibility to use any of the information about regions that they feel is appropriate. Participants and leaders should review plant succession processes, special habitats such as riparian, common plants, wildlife species, and management practices. Specific information about habitat requirements and recommended management practices are found in the *Wildlife Species* section where wildlife species are listed in alphabetical order by the accepted common name. Whenever possible, participants should go to the field and find examples of the principles and practices found in these sections. Leaders can use "quiz bowls" and question-answer sessions to measure learned knowledge.

Following the above exercises, leaders can introduce participants to the various activities found in the handbook. Conducting practice sessions using aerial photographs and outdoor sites will be helpful. Start with only two or three wildlife species, adding more as participants become more knowledgeable. Obtain several aerial photographs (local Soil Conservation Service office) preferably with a scale of 8 inches equals 1 mile, and discuss their features. Explain to participants how these features are important to wildlife. Identify the habitat requirements that are available for the animals selected. Then ask participants to identify what needs are missing. As participants become more skilled, have them rate a set of photos as to the value for different wildlife species. Review their ratings. To practice giving oral reasons, have them justify their ratings. Review and practice writing management plans. Review the *Foods* section and practice identifying foods used by the various wildlife groups.

Videos, textbooks and other teaching materials may be used to further learning. State Cooperative Extension Wildlife Specialists and 4-H offices have information regarding the availability of such materials. Local and state events may use different wildlife species and activities than those recommended in the handbook. **However, in the national event all activities and only the wildlife species and wildlife management practices listed in this handbook will be used.**

Beginning and young 4-H'ers are not expected to perform all of the activities. Organizers of state and local events may wish to limit the activities for junior division participants (8 to 13 years old). Written management plans and oral reasons may not be appropriate for this age group. **Participants in the national event (14 to 19 years old) will be asked to perform all of the activities in this handbook.**

General Rules and Guidelines

This event will comply with all "Policies and Guidelines for National 4-H Competitive Events" as approved by ECOP.

I. Contestants and Eligibility:

A. Each state is allowed to enter only one team or up to two individual contestants. A team will consist of no less than three and no more than four official entrants who are 4-H members in their state during the current year. If a state is unable to assemble a team, it may send up to two contestants to the individual events only.

B. All contestants must have passed their 14th birthday on or before December 31 of the preceding year and must not have passed their 19th birthday before January 1 of the contest year.

C. An individual or team may enter the National 4-H Wildlife Invitational event only once.

D. The team of contestants must be certified as the official state entry by the State Extension Director or by a person designated by the Director. The individuals or team may be selected by any procedures which a state considers appropriate. It is recommended that each state obtain medical authorizations for participants and have participation contract agreements signed by coaches and participants before conducting state and local events.

E. Contestants in the National 4-H Wildlife Invitational must not have participated in official post-secondary (university, college, junior college, or technical school) competitive events of a similar nature in the same subject matter area. Neither can participants be a member of a post-secondary team undergoing training in preparation for an event. For example, a contestant who has competed in an official collegiate wildlife contest, on or off campus, is ineligible to compete. The State 4-H Program Leaders are responsible for determining the eligibility for participants in National 4-H Competitive Events from their respective states.

II. General Contest Rules and Information:

A. State team entries must be submitted on an official entry blank.

B. Each team shall have no more than one coach and two assistants (or other non-contestants) accompanying the team to the Invitational. Current 4-H members may serve as coaches for the team, but those individuals will be ineligible as future contestants.

C. Adult representatives from states not competing in the current Invitational are welcome to observe. They may be asked to assist in the Invitational administration.

D. Contestants will work independently on Activities I, II and III and in teams for Activities IV and V. Scorecards will be turned in to an official committee member immediately after each event. The team score will be the sum of the three highest accumulative individual scores in Activities I, II and III plus the team scores for Activities IV and V.

E. All contestants must provide their own pen/pencil and clipboard.

F. Activity IV, Wildlife Management Plan, and Activity V, Urban Landscape and Backyard Habitat Plan, will be completed as a team effort. A maximum of one page will be allowed for the written plans.

G. A maximum of five minutes will be allowed for oral reasons in Activity III, Aerial Photograph Interpretation.

H. Absolutely no talking by contestants during the contest except when working as a group on Activities IV and V.

I. Anyone caught cheating will be disqualified.

J. No use of alcoholic or tobacco substances will be allowed during actual competition. Rules of the 4-H camp will be enforced.

K. All adults, except contest officials, will be separated from contestants at all times while the contest is in progress.

L. An official committee will score the contest and analyze results. Their decision is final.

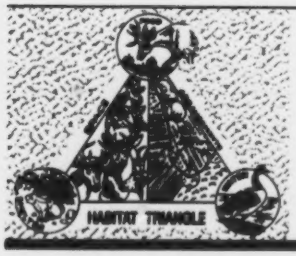
M. After the event, individual and team scores will be sent to the team coach. Contest score sheets will not be distributed.

N. Although there will be some limited training and practice at the camp before the contest begins, all contestants should study this handbook and be prepared before coming to the national event. Questions will not be allowed during the contest, except those relating to contest procedures.

O. A materials packet to supplement this handbook will be available for leaders and participants well in advance of the national event. The packet will contain information on which regions and wildlife species will be used in the up-coming event. The materials packet will be supplied by the Wildlife Extension Specialist, 4-H office, or other qualified personnel from the state hosting the national event.

P. Award categories:

First Place Team
Second Place Team
Third Place Team
First Place Team Members
First Place Team Coach
First Place High Individual
Second Place High Individual
Third Place High Individual



Wildlife Management Concepts and Terms

Before an individual can evaluate wildlife habitat and make management recommendations, some basic concepts about habitat and its relation to different wildlife species should be understood. In this section some of the basic concepts will be described. Since most of the contest will be based on these concepts, it is important that you study and understand them.

Wildlife management and all natural resource fields are both arts and sciences that deal with complex interactions in the environment. For the purposes of this program, a number of assumptions and simplifications have been made to make the materials more understandable. In actual management cases, it is always wise to call upon trained, experienced professionals to assist you in making proper decisions to meet your goals and objectives.

Look up the definition of words or terms you do not understand in a dictionary or in the glossary found at the back of the handbook.

Concept 1

Habitat Requirements

Wildlife have life requirements that must be supplied by the habitat to insure their well being. These are known as "habitat requirements." The four basic habitat requirements are food, water, space and cover or shelter. Each species has its own set of specific requirements. For example, the gray squirrel uses acorns for food, while the woodpecker eats insects. Mallards use thick grass and forb cover for nesting, while thrashers nest in shrubs. Habitat requirements for wildlife change during the seasons of the year. The food they eat in the winter may be much different than what is eaten in the summer. The cover they need for nesting may be much different than the cover needed to survive a winter storm.

Concept 2

Featured Species

There are two basic goals in wildlife habitat management. One is to provide the best habitat possible for specific featured wildlife species. The other, which is explained later in this handbook under the concept Species Richness, is to provide habitat for as many different wildlife species as possible in an area.

When evaluating habitat for featured species, one must first decide which species are to be favored. This can be done in several ways. Landowners may have certain objectives for specific species, or the general public may have concerns about particular game or endangered species. Once the species are selected, identify the habitat requirements for each species and evaluate the capability of the environment to provide the requirements. If the area is unable to supply or only partially provides the necessary habitat requirements, management practices may be used to improve the area's ability to supply needed requirements.

It is usually best to select management practices that provide the requirements that are in the shortest supply. For instance, if a species requires trees for cover with water nearby, and the habitat you are evaluating has plenty of trees but no water, a management practice that supplies water will improve the habitat more effectively than planting trees.

When determining which management practices to apply, remember, management practices that improve habitat for some wildlife species may be detrimental to other wildlife species. It is impossible to manage habitat for any one species without influencing other species in some manner.

Concept 3

Plant Succession and Its Effect on Wildlife

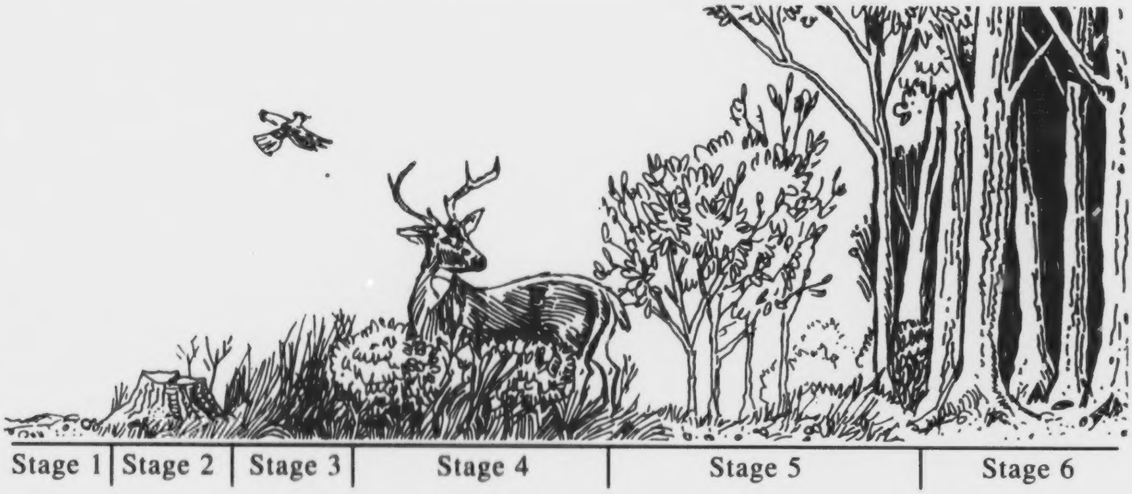
Vegetation and water are the basis of habitat management. Every acre of soil and water has a definite sequence in plant cover that occurs over time. The different stages of this sequence are called successional stages. We can usually predict the type of vegetation that will occur in each stage until a final or "climax" stage is reached. When not disturbed, the climax vegetation is stable and will remain the same for long periods of time. If humans or nature disturbs the soil or water level, succession may be set back and the cycle will continue forward from the new starting point.

In this handbook areas in different stages of plant succession are often referred to as areas with different vegetation types or habitat types. In general, the stages of plant succession that occur on land are as follows:

1. **Bare ground;**
2. **Annual forbs and/or grasses;**
3. **Perennial forbs and grasses;**
4. **Shrubs;**
5. **Young woodland or trees;**
6. **Mature woodland or trees.**

In some regions, natural factors such as the soil or the climate will prevent succession from proceeding past a certain stage. For instance, in the Great Plains Grassland Region, lack of precipitation often prevents succession from proceeding past stage 3. In this case, stage 3 would be considered the climax stage.

Descriptions of typical successional stages found in different regions of the United States can be found in the *Regions* section of this handbook. A description of the typical successional stages occurring in relation to water can be found in the Wetland Region description. The stages of plant succession are illustrated below.



A single step in this succession may take weeks, months, years, or even centuries depending on a variety of natural and human-caused factors. If vegetation is disturbed, succession will revert to an earlier stage and begin again. Disturbance can be caused by natural factors such as insect or disease outbreaks, tornadoes, hurricanes, avalanches, or naturally occurring fires.

However, succession is more frequently altered by humans through plowing (agriculture), burning, cutting of forests, grazing, and clearing shrubby areas, which may in many cases mimic natural disturbances.

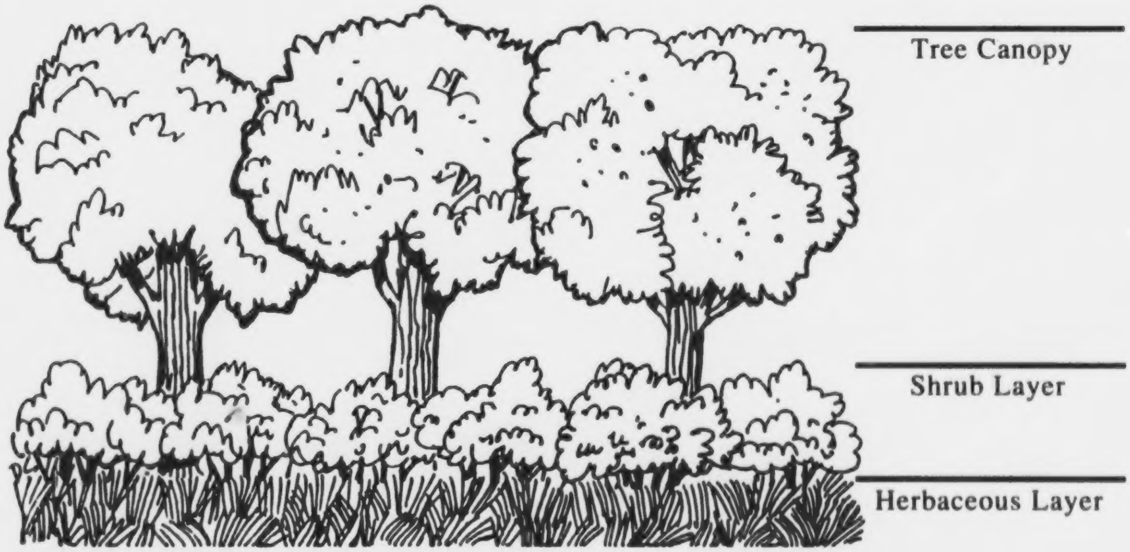
Nature never gives up. Even abandoned, concrete parking lots are eventually taken over by plants. Plants first grow in the cracks and around the edges, then if left alone, a concrete parking lot will eventually become "habitat" for some wildlife species.

Concept 4

Vertical Structure (Layering)

Vegetation can be classified by how it grows. Grasses and forbs generally grow close to the ground and make up the ground layer. The next highest level is usually comprised of shrubs and is called the shrub layer. The tallest stratum is made by trees and is called the tree canopy.

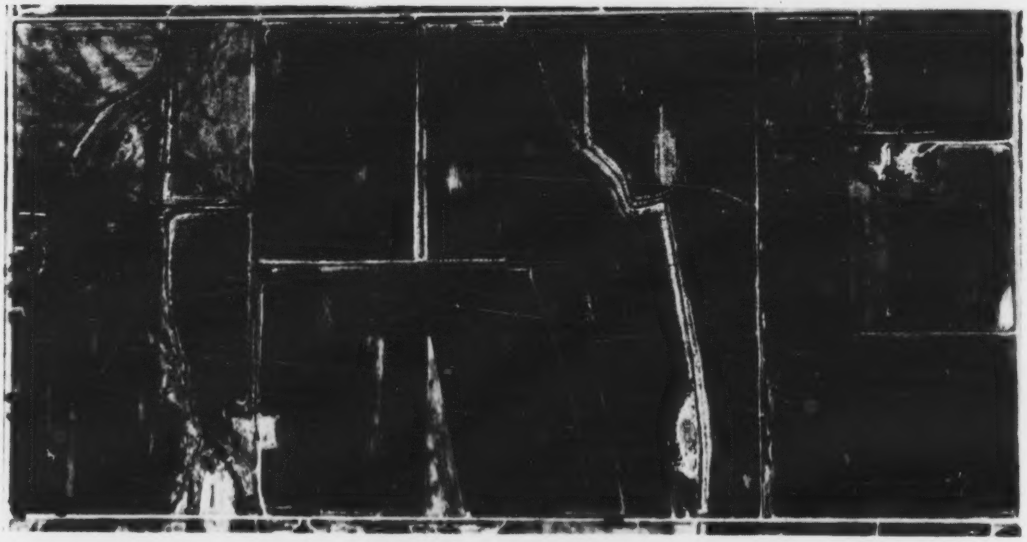
How different layers of vegetation are arranged in relation to each other is important to many wildlife species. For instance, some species may require a herbaceous layer for food but also need a tree canopy for cover. Not all areas in a single stage of succession are alike. One woodland in stage 6 of succession may have a variety of layers comprised of grasses, forbs, shrubs, and trees, while another stage 6 woodland may have only one distinct layer of tall trees.



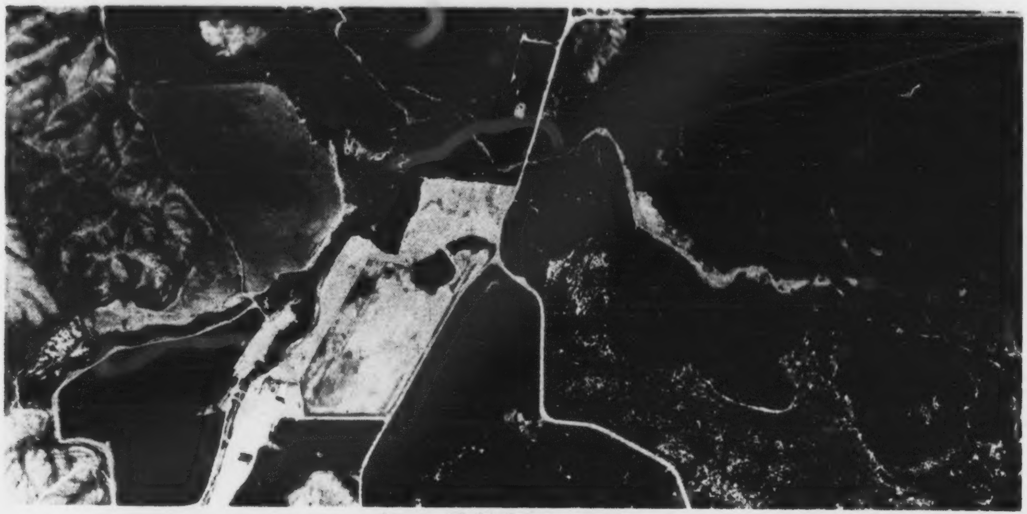
Concept 5

Arrangement and Interspersion

How different successional stages or vegetation types are situated in relation to each other is often referred to as horizontal arrangement. Many wildlife species need more than one successional stage to provide all their habitat requirements. To be of value, the different successional stages must be close to each other to allow safe travel for wildlife. Some species obtain all their habitat requirements from only one successional stage. Mixing plots of different successional stages within an area is called "interspersion." Usually, more interspersion supports a greater variety of wildlife. A way to measure interspersion is explained on page 108.



Area with low interspersion



Area with high interspersion

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Concept 6

Edges and Contrast

The boundary where two or more different types of vegetation or successional stages meet is called "edge." Sometimes there is an abrupt change where one type of vegetation stops and another begins (see figure 1). Or it can be less distinct with a gradual transition from one stage to another (see figure 2). In places where a gradual change occurs, an edge looks a little like both successional stages or vegetation types. Where abrupt changes occur the edge is narrow. Edges attract many different wildlife species because the variety of food, cover, and other habitat requirements are arranged close together.

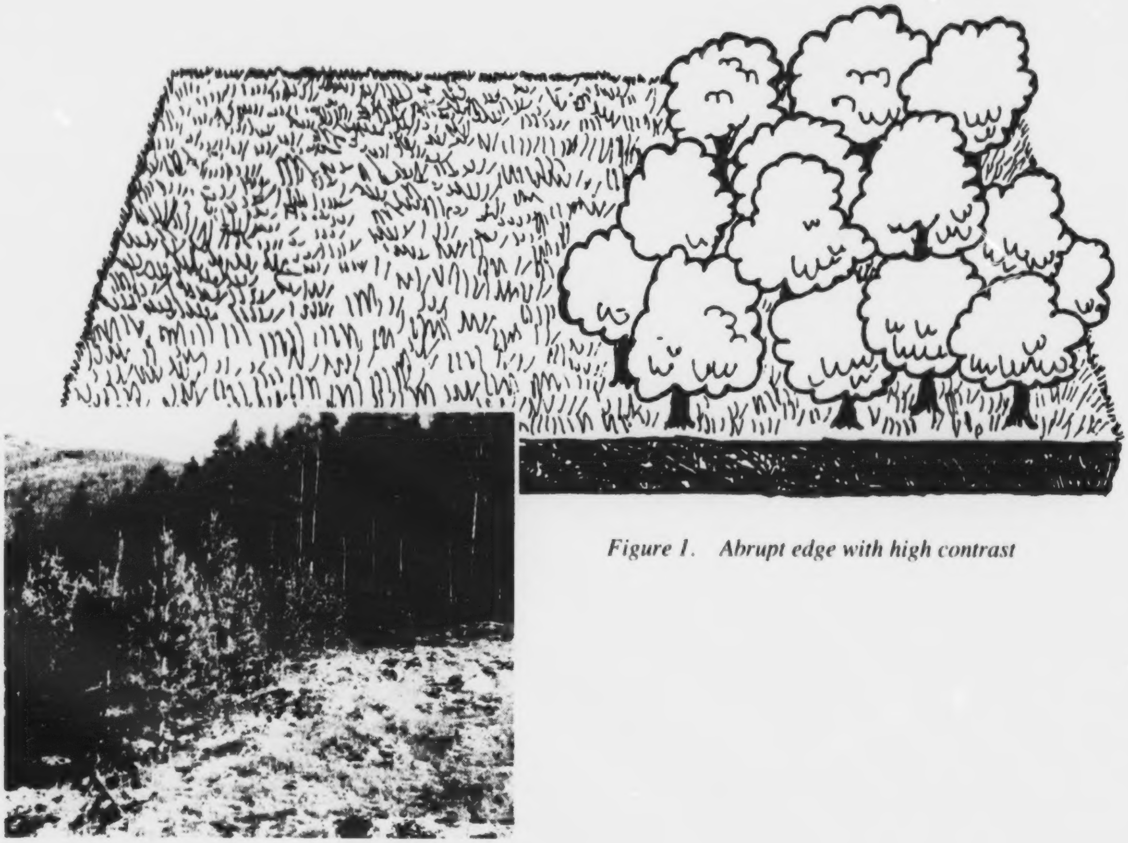


Figure 1. Abrupt edge with high contrast

Edges produced when successional stages have extremely different types of vegetation are defined as having high contrast. There is high contrast where an area in stage 2 (grass and forbs) meets an area in stage 6 (tall trees) of plant succession. A boundary between stages 2 and 3 has low contrast. Generally edges with high contrast have more species of wildlife than edges with low contrast.

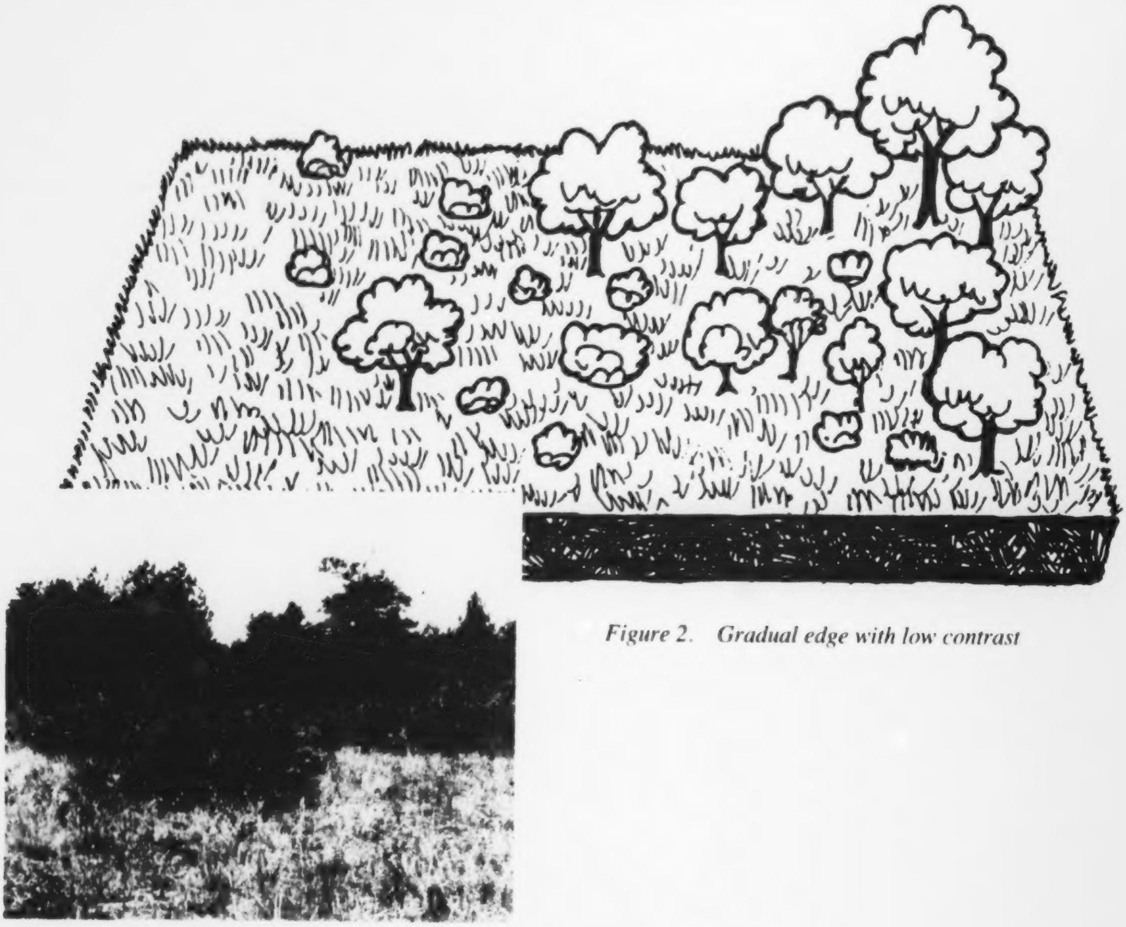


Figure 2. Gradual edge with low contrast

Concept 7

Amount of Edge and Size of Areas In One Successional Stage

Edge is not beneficial for all wildlife. Some wildlife species need unbroken areas in a certain successional stage to provide some or all of their habitat requirements. A balance of edge with blocks of vegetation in one successional stage is desirable. Areas with unbroken blocks that are 10 to 40 acres in size are considered to have a good balance of edge and unbroken blocks. In large forests, blocks of up to 100 acres may be desirable.

Concept 8

Corridors

"Corridors" are areas of continuous habitat that permit animals to travel securely from one habitat to another. As environments become more broken up (fragmented) from construction of roads, parking lots, urban areas, harvest of timber, clearing for agriculture, etc., small islands of vegetation remain.

Corridors allow animals to find and use the islands of suitable habitat. For example, in an urban area, relatively unbroken corridors found along riparian areas and ravines allow wildlife to move into parks, and other suitable habitats. Preservation, maintenance, and creation of unbroken corridors are very important in wildlife habitat management.

Concept 9

Species Richness

"Species richness" is defined as the number of different kinds of wildlife species that are found in an area. As discussed earlier, one goal in wildlife habitat management may be to provide habitat for as many species as possible.

Lands that are high in species richness usually have many of the following characteristics:

1. **A mixture of areas in different successional stages;**
2. **A balance of edges with unbroken blocks of vegetation in one successional stage;**
3. **Unbroken block sizes of 10 to 40 acres;**
4. **Edges with high contrast;**
5. **A wide variety of vegetation layers present within each area containing only one successional stage.**

These characteristics can be used to estimate the relative number of different wildlife species that may be present in separate areas. They also may be used to identify management practices that could increase species richness. For example, consider an area that is in stage 6 of plant succession. It has been proposed to harvest the trees by clear-cutting 1/2 of the area. Clear-cuts in 40-acre blocks that leave adjacent unharvested blocks 40 acres in size would be desirable. Strips or corridors of trees that link the larger unharvested blocks together could be left uncut (see Concept 5 - Corridors).

Remember, when managing habitat for species richness, it is often not possible to provide the best habitat for featured species. Instead of providing the best habitat possible for a few species, the goal is to provide some habitat for as many species as possible.

Concept 10

Migration

Some wildlife travel during different seasons of the year and times of day. This requires that necessary habitats are available along the route. The movements are called "migration." Migration distances may be short or very long depending on the species. For many species, corridors that provide areas for safe travel are very important during migration.

Here are two examples:

1. Deep snow covers the vegetation used for food by mule deer and wapiti (elk) during the winter in the Subalpine Zone. To find food they travel to lower elevations (Intermountain Foothills or Intermountain Sagebrush Regions) where the snow is not as deep.

2. Ducks that nest in the northern United States must fly south to warmer climates to find food sources and wetlands that are not frozen during winter.

Concept 11

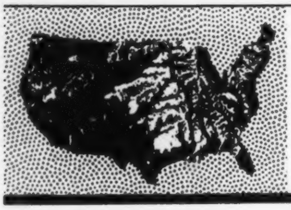
Carrying Capacity

There is a limit to how many animals can live in a habitat. That limit is called the habitat's "carrying capacity." The quantity and quality of food, water, cover, and space determines the carrying capacity. If one basic requirement is in short supply the carrying capacity is lowered. By adding the missing ingredient, a manager can increase the habitat's carrying capacity.

Carrying capacity varies from year to year and from season to season. It is usually greatest from late spring through fall. This is when most young are born and grow. With the coming of winter or summer drought, food and cover gradually diminish as does the habitat's carrying capacity.

More animals are produced each year than will survive to the next. When this happens, all extra or surplus animals will be lost in an existing habitat. Young wildlife and animals in poor health experience the highest death rates. The obvious way to increase the number of animals is to increase the number born and reduce the number that die. However, if the habitat cannot support any more animals, these efforts will fail.

A long-term increase in population can only be accomplished by increasing the habitat's carrying capacity.



Regions

In this section, areas of the country are separated into regions having similar climate, vegetation, and wildlife. They are described in very general terms. The Wetland and Urban Regions should be used in any of the other regions where they occur.

Use the regions that most nearly describes your local area, your state, or the area where the national contest will be held. Remember this is a local decision that individuals familiar with the area should make.

At the end of each region description is a list of the wildlife species recommended to use while evaluating habitat in that region. You can use any or all of the listed species, or when applicable, use species listed under other regions. Some of the species listed are considered to be a nuisance in some areas and circumstances, but they also have significant roles in habitats. Contest organizers may wish to exclude such species from local activities or center the activities on why the species are pests and what can be done to decrease problems.

Each region description is followed by a table that identifies some of the practices used to manage habitat for the species listed. Specific information on recommended habitat management practices for each species can be found in the *Wildlife Species* section of this handbook.

At local and state contests, you may wish to use more than one region and/or substitute local species for those listed. **However, at the national contest, only the appropriate region descriptions, species, and wildlife management practices listed in this handbook will be used.**

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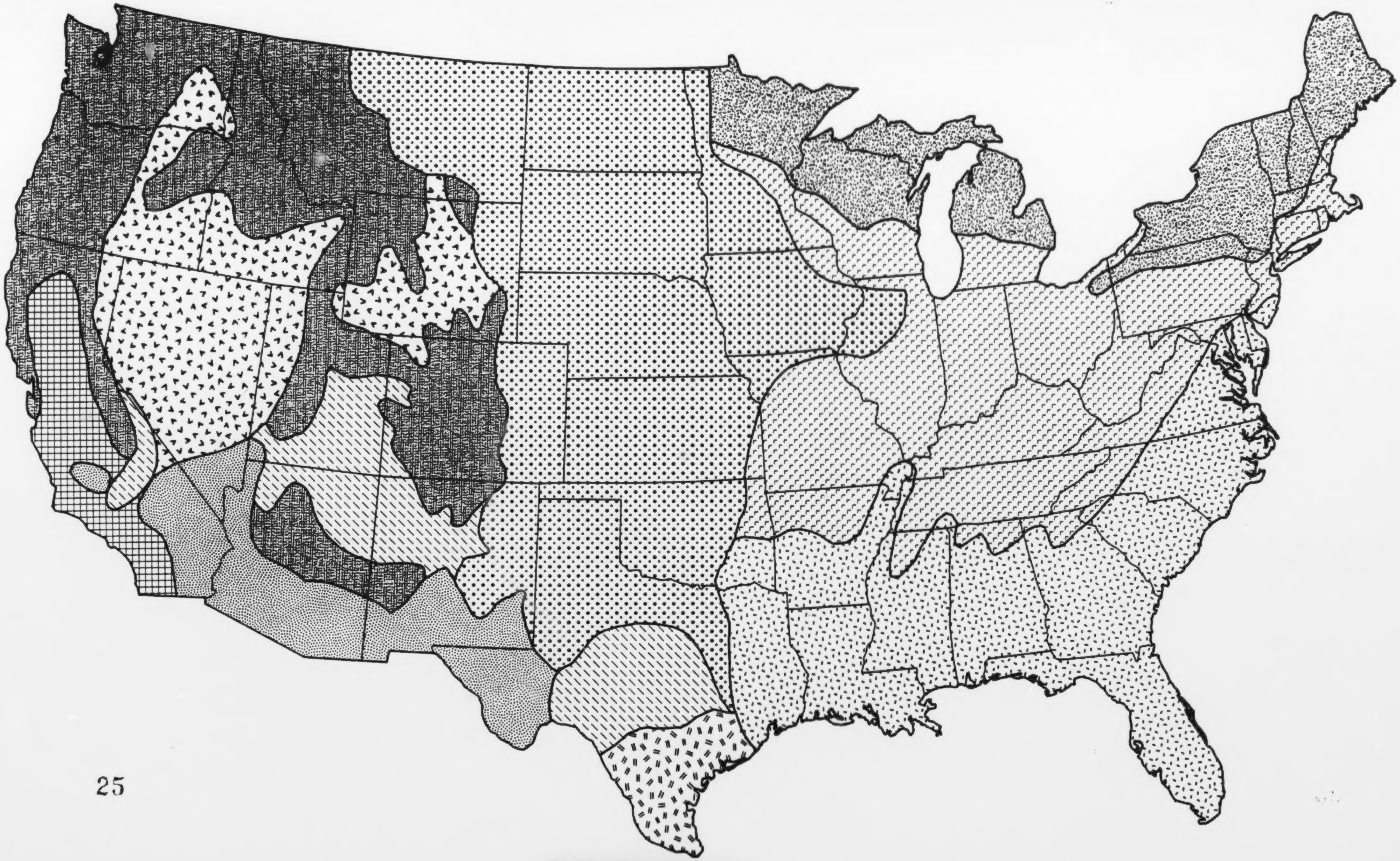

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Map of Regions

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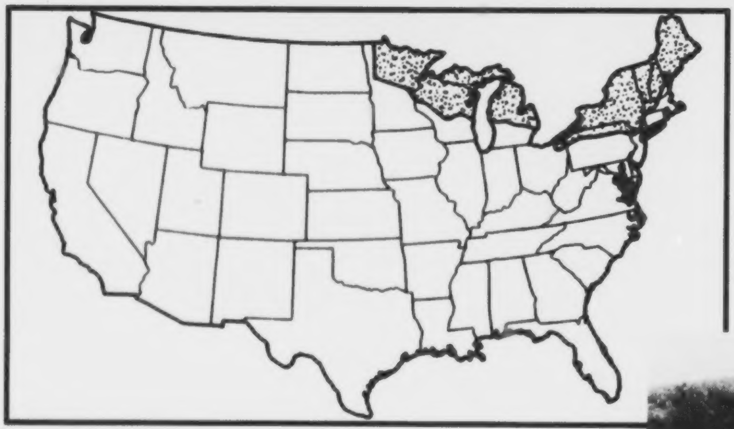
Northeast Mixed Forest



Physical Description:

The terrain is flat with some rolling hills and low mountains. The average annual precipitation ranges from 24 to 45 inches. Most of the precipitation is received in the summer, but snow is usually on the ground all winter. Summers are warm and winters very cold.

Dominant Vegetation:

This region is transitional between the evergreen dominated forests to the north and the broadleaf dominated forests to the south.

The final stages of succession can be dominated by both tall broadleaf (deciduous) and conifer (evergreen) trees. They can be mixed together or in separate stands adjacent to each other. The dominant conifers are white pine, red spruce, subalpine fir, eastern hemlock, and eastern red cedar. Beech, sugar maple, and basswood are the most common deciduous trees.

Common shrubs are rhododendron, dogwood, cranberry, and hobblebush. A wide variety of forbs and grasses are found on the forest floor.

Farming and Ranching:

Very large areas of this region have been cleared of the native vegetation for industrial use, urban sprawl, and production of crops and livestock forage. In some areas, extremely poor soils and short growing seasons put limitations on agriculture.

Depending on how the pastures and cropland are managed, some species of wildlife may benefit from farming, especially if trees and shrubs are nearby.

Plant Succession Stages:

Stage 1 — bare ground; Stage 2 — annual forbs and grasses; Stage 3 — perennial grasses and forbs; Stage 4 — shrubs; Stage 5 — young woodland; Stage 6 — mature woodland.

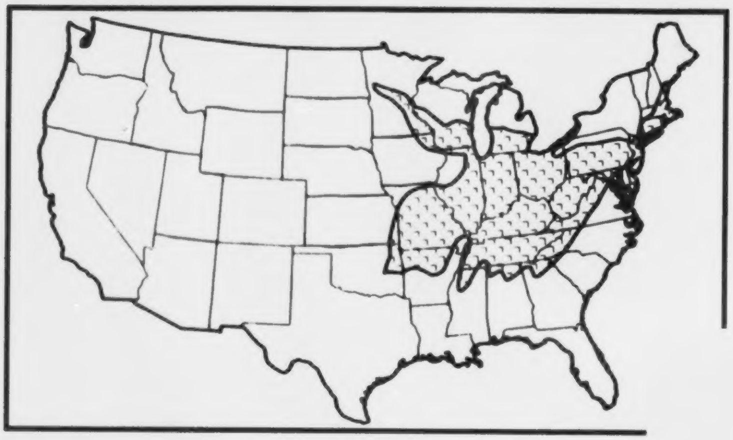
Species Recommended for Judging:

American kestrel
Brown thrasher
Eastern bluebird
Eastern cottontail
Eastern fox squirrel
Hairy woodpecker
Mourning dove
Northern bobwhite
Ovenbird
Raccoon
Ruffed grouse
Turkey
Varying hare
White-tailed deer
Wood duck
Bluegill
Largemouth bass

Northeast Mixed Forest

	American Kestrel	**Brown Thrasher**	Eastern Bluebird	Eastern Cottontail	Eastern Fox Squirrel	**Hairy Woodpecker**	Mourning Dove	Northern Bobwhite	Ovenbird	**Raccoon**	Ruffed Grouse	Turkey	Varying Hare	**White-tailed Deer**	Wood Duck	Largemouth Bass and Bluegill
2. Brush chopping (mowing)	X	X	X	X			X	X		X		X		X		
3. Brush piles				X				X					X			
5. Controlled (prescribed) burning	X	X	X	X			X	X		X	X	X		X		
7. Disking							X	X				X				
10. Grain, leave unharvested					X		X	X		X		X		X		
11. Harvest less				X	X		X	X		X	X	X	X	X	X	X
12. Harvest more				X	X		X	X		X	X	X	X	X	X	X
14. Lime ponds and fields				X			X	X		X		X		X		X
15. Livestock grazing management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16. Nesting boxes/structures/platform	X		X		X		X								X	
17. Plant food plots				X			X	X		X		X		X		
18. Plant grass and legumes												X		X		
19. Plant mast trees					X							X		X	X	
20. Plant trees or shrubs	X	X	X	X	X	X	X	X	X	X		X		X	X	
21. Ponds/lakes artificial reefs																X
22. Ponds, clear muddy water																X
23. Pond construction							X			X					X	X
24. Small dikes for temporary flooding															X	
25. Ponds, deepen edges																X
26. Ponds, determine balance																X
27. Ponds, diversion ditches																X
28. Ponds, fertilize																X
29. Ponds, remove trees near dike							X			X					X	X
30. Ponds, repair spillway							X			X					X	X
31. Ponds, reseed watershed/filter strip																X
32. Ponds, restock																X
33. Ponds, stop leaks							X			X					X	X
34. Ponds/wetlands, shallow water										X					X	
39. Tillage, eliminate in fall					X		X	X				X				
40. Timber harvest, clear-cut	X		X	X	X		X	X		X	X	X		X		
41. Timber harvest, selective-cut		X			X			X	X	X	X	X	X	X	X	
42. Water control structures										X					X	X

Eastern Deciduous Forest



Physical Description:

Most of the terrain is rolling except for the Appalachian Mountains which are steep. The average annual precipitation ranges from 35 to 60 inches and is well distributed throughout the year. Summers are hot and dry. Winters are cold.

Dominant Vegetation:

The final stage of succession is dominated by tall broadleaf trees. Depending on the geographic location, trees such as oaks, beech, basswood, buckeye, hickory, walnut, maple, and birch can be indicators of climax vegetation.

There are many lower canopy trees and deciduous shrubs that are important including American hornbeam, hophornbeam, sassafras, eastern redbud, flowering dogwood, and striped maple.

Common shrubs are pawpaw, spicebush, arrow-wood, black huckleberry, blueberry, hawthorn, witch-hazel, and viburnums. A wide variety of forbs are also found on the forest floor. Grasses and annual forbs are mostly limited to areas recently disturbed.

Farming and Ranching:

Large areas of this region have been cleared of the native vegetation for the production of crops and livestock forage.

In many areas, only steep slopes, frequent floods, or water associated with rivers and swamps have prevented the total clearing of forests.

Depending on how croplands are managed, some species of wildlife benefit from farming, especially if trees and shrubs are nearby.

Plant Succession Stages:

Stage 1 — bare ground; Stage 2 — annual forbs and grasses; Stage 3 — perennial forbs and grasses; Stage 4 — shrubs; Stage 5 — young woodland; Stage 6 — woodland.

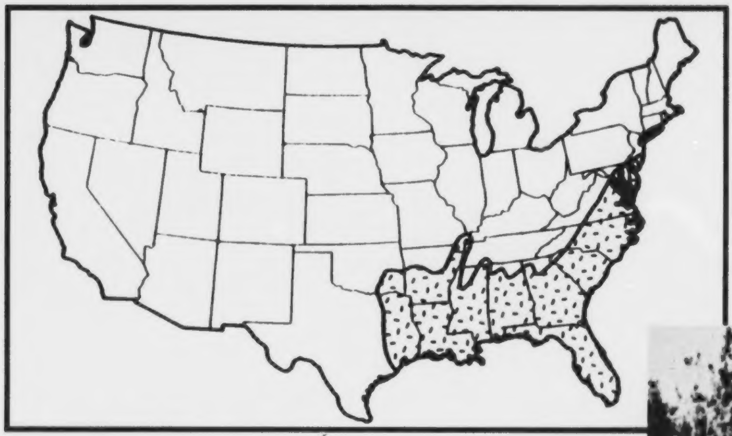
Species Recommended for Judging:

American kestrel
Brown thrasher
Eastern bluebird
Eastern cottontail
Eastern gray squirrel
Hairy woodpecker
Mourning dove
Northern bobwhite
Ovenbird
Raccoon
Ruffed grouse
Turkey
White-tailed deer
Wood duck
Bluegill
Largemouth bass

Eastern Deciduous Forest

	American Kestrel	**Brown Thrasher**	Eastern Bluebird	Eastern Cottontail	Eastern Gray Squirrel	**Hairy Woodpecker**	Mourning Dove	Northern Bobwhite	Ovenbird	**Raccoon**	Ruffed Grouse	Turkey	White-tailed Deer	**Wood Duck**	Bluegill	Largemouth Bass
2. Brush chopping (mowing)	X	X	X	X			X	X		X		X	X			
3. Brush piles				X				X								
5. Controlled (prescribed) burning	X	X	X	X			X	X		X	X	X	X			
7. Disking							X	X				X				
10. Grain, leave unharvested					X		X	X		X		X	X			
11. Harvest less				X	X		X	X		X	X	X	X	X	X	X
12. Harvest more				X	X		X	X		X	X	X	X	X	X	X
14. Lime ponds and fields				X			X	X		X		X	X		X	X
15. Livestock grazing management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16. Nesting boxes/structures/platform	X		X		X		X							X		
17. Plant food plots				X			X	X		X		X	X			
18. Plant grass and legumes												X	X			
19. Plant mast trees					X							X	X	X		
20. Plant trees or shrubs	X	X	X	X	X	X		X	X	X		X	X	X		
21. Ponds/lakes artificial reefs															X	X
22. Ponds, clear muddy water															X	X
23. Pond construction							X			X				X	X	X
24. Small dikes for temporary flooding														X		
25. Ponds, deepen edges															X	X
26. Ponds, determine balance															X	X
27. Ponds, diversion ditches															X	X
28. Ponds, fertilize															X	X
29. Ponds, remove trees near dike							X			X				X	X	X
30. Ponds, repair spillway							X			X				X	X	X
31. Ponds, reseed watershed/filter strip															X	X
32. Ponds, restock															X	X
33. Ponds, stop leaks							X			X				X	X	X
34. Ponds/wetlands, shallow water										X				X		
39. Tillage, eliminate in fall					X		X	X				X				
40. Timber harvest, clear-cut	X	X	X	X			X	X		X	X	X	X			
41. Timber harvest, selective-cut		X			X			X	X	X	X	X	X	X		
42. Water control structures										X				X	X	X

Southeast Mixed and Outer Coastal Plain Forest



Physical Description:

The terrain is mostly flat. Marshes, lakes, and swamps are numerous on the coastal plains. The average annual precipitation ranges from 40 to 60 inches. Precipitation is received throughout the year. Summers are hot and winters are mild.

Dominant Vegetation:

The final successional stage of vegetation usually consists of deciduous trees such as oak, hickory, sweetgum, blackgum, red maple, redbay, southern magnolia, laurel oak, American holly, and winged elm, or occasionally coniferous trees such as loblolly pine. Pines such as slash and shortleaf are common on sites after a disturbance. Lower-story trees can include American hornbeam, redbud, shadbush, dogwood, and hawthorns.

Forbs and grasses are common understory plants. Shrubs such as Virginia creeper, yellow jessamine, dogwood, viburnum, haw, and blueberry are also common especially in the third or fourth successional stages.

Gum and cypress trees are dominant on moist areas along the Atlantic Coast.

Farming and Ranching:

Many wetlands along major river courses have been drained and forests cleared to grow crops such as tobacco, cotton, corn, and other grain crops. Large areas of forests have also been cleared and planted to grasses and legumes to provide forage for livestock.

Plant Succession Stages:

Stage 1 — bare ground; Stage 2 — annual forbs and grasses; Stage 3 — perennial grasses and forbs; Stage 4 — shrubs; Stage 5 — young woodland; Stage 6 — mature woodland.

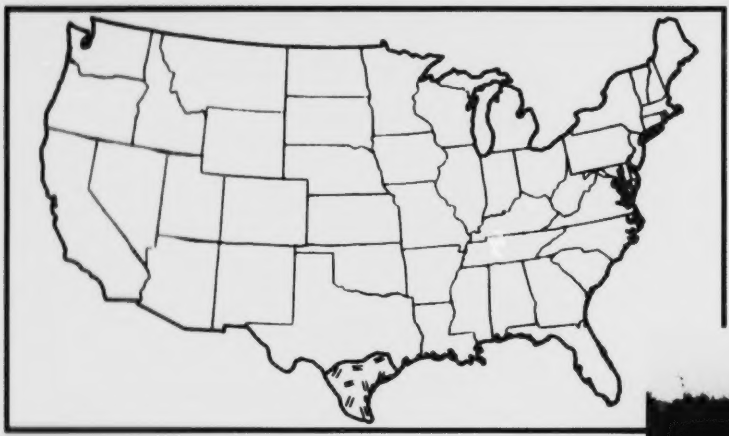
Species Recommended for Judging:

- American kestrel
- Brown thrasher
- Eastern bluebird
- Eastern cottontail
- Eastern gray squirrel
- Hairy woodpecker
- Mourning dove
- Northern bobwhite
- Raccoon
- Ruffed grouse
- Turkey
- White-tailed deer
- Wood duck
- Bluegill
- Largemouth bass

Southeast Mixed and Outer Coastal Plain Forests

	American Kestrel	**Brown Thrasher**	Eastern Bluebird	Eastern Cottontail	Eastern Gray Squirrel	**Hairy Woodpecker**	Mourning Dove	Northern Bobwhite	Raccoon	**Ruffed Grouse**	Turkey	White-tailed Deer	Wood Duck	**Bluegill**	Largemouth Bass
2. Brush chopping (mowing)	X	X	X	X			X	X	X		X	X			
3. Brush piles				X				X							
5. Controlled (prescribed) burning	X	X	X	X			X	X	X	X	X	X			
7. Disking							X	X			X				
10. Grain, leave unharvested					X		X	X	X		X	X			
11. Harvest less				X	X		X	X	X	X	X	X	X	X	X
12. Harvest more				X	X		X	X	X	X	X	X	X	X	X
14. Lime ponds and fields				X			X	X	X		X	X		X	X
15. Livestock grazing management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16. Nesting boxes/structures/platform	X		X		X		X						X		
17. Plant food plots				X			X	X	X		X	X			
18. Plant grass and legumes											X	X			
19. Plant mast trees					X						X	X	X		
20. Plant trees or shrubs	X	X	X	X	X	X		X	X		X	X	X		
21. Ponds/lakes artificial reefs														X	X
22. Ponds, clear muddy water														X	X
23. Pond construction							X		X				X	X	X
24. Small dikes for temporary flooding													X		
25. Ponds, deepen edges														X	X
26. Ponds, determine balance														X	X
27. Ponds, diversion ditches														X	X
28. Ponds, fertilize														X	X
29. Ponds, remove trees near dike							X		X				X	X	X
30. Ponds, repair spillway							X		X				X	X	X
31. Ponds, reseed watershed/filter strip														X	X
32. Ponds, restock														X	X
33. Ponds, stop leaks							X		X				X	X	X
34. Ponds/wetlands, shallow water									X				X		
39. Tillage, eliminate in fall					X		X	X			X				
40. Timber harvest, clear-cut	X	X	X	X			X	X	X	X	X	X			
41. Timber harvest, selective-cut		X			X			X	X	X	X	X	X		
42. Water control structures									X				X	X	X

Prairie Brushland



Physical Description:

The terrain is level to rolling hills. Average annual precipitation is between 17 and 32 inches, increasing from northwest to northeast. Most of the moisture is received in the fall and spring. The summers are hot and winters are warm.

Dominant Vegetation:

Climax vegetation is characterized by grassland mixed with dense to open stands of shrubs forming a shrub savanna. Depending on the area, shrubs such as mesquite, black brush, catclaw, huisache, and guajillo are common in final successional stages. Other species that contribute to the shrub layer include white brush, bluewood, lotebush, coyotillo, live oak, cenizo, prickly pear, and chollas.

Some of the more common grasses associated with climax vegetation include various species of bluestem and paspalum, Arizona cottontop, buffalo grass, bur grass, dropseed, pink pampas grass, windmill grass, slender grama, hairy grama, common sandbur, and various species of bristlegrass.

Vegetation associated with river and stream courses is different than the surrounding vegetation. Trees such as live oak and hackberry are common along water courses. Mesquite grows much larger, looking more like a tree than a shrub, and the vegetation in general is more robust. The abundance and variety of vegetation combined with the availability of water make these areas attractive for wildlife.

Farming and Ranching:

There is very little farming done in this region. The large areas of shrubs and grasslands are used primarily for livestock grazing.

Plant Succession Stages:

Stage 1 — bare ground; Stage 2 — annual forbs and grasses; Stage 3 — perennial forbs and grasses; Stage 4 — shrubs and perennial grass forb mix. Continual heavy grazing of perennial grasses can encourage a stage 4 that is dominated almost entirely by shrubs.

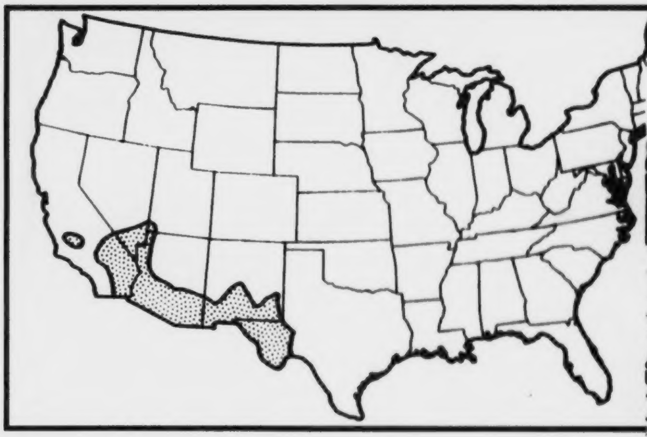
Species Recommended for Judging:

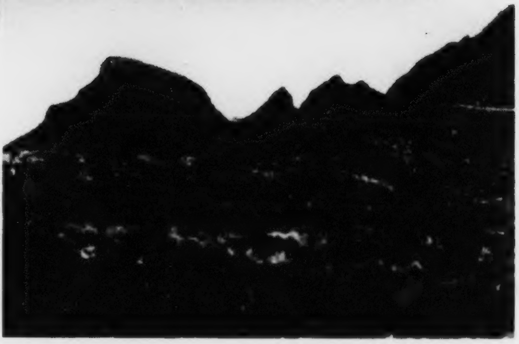
American kestrel
Brown thrasher
Eastern cottontail
Eastern bluebird
Ladder-backed woodpecker
Mallard (winter habitat)
Northern bobwhite
Raccoon
Rufous-sided towhee
Turkey
Western kingbird
White-tailed deer
White-winged dove
Largemouth Bass
Bluegill

Prairie Brushland

	American Kestrel	**Brown Thrasher**	Eastern Cottontail	Eastern Bluebird	Ladder-backed Woodpecker	**Mallard (winter)**	Northern Bobwhite	Raccoon	Rufous-sided Towhee	**Turkey**	Western Kingbird	White-tailed Deer	White-winged Dove	**Bluegill**	Largemouth Bass
2. Brush chopping (mowing)	X	X	X	X			X	X	X	X	X	X	X		
3. Brush piles			X	X			X								
4. Chaining/roller beating	X	X	X	X			X	X	X	X	X	X	X		
5. Controlled (prescribed) burning	X	X	X	X			X	X	X	X	X	X	X		
7. Disking							X			X			X		
10. Grain, leave unharvested						X	X	X		X		X	X		
11. Harvest less			X			X	X	X		X		X	X	X	X
12. Harvest more			X			X	X	X		X		X	X	X	X
14. Lime ponds and fields			X				X	X		X		X	X	X	X
15. Livestock grazing management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16. Nesting boxes/structures/platforms	X			X											
17. Plant food plots			X				X	X		X		X	X		
18. Plant grass and legumes										X	X	X	X		
19. Plant mast trees										X		X			
20. Plant trees or shrubs	X	X	X	X	X		X	X	X	X	X	X	X		
21. Ponds/lakes artificial reefs														X	X
22. Ponds, clear muddy water														X	X
23. Pond construction						X		X					X	X	X
24. Small dikes for temporary flooding						X									
25. Ponds, deepen edges														X	X
26. Ponds, determine balance														X	X
27. Ponds, diversion ditches														X	X
28. Ponds, fertilize														X	X
29. Ponds, remove trees near dike						X		X					X	X	X
30. Ponds, repair spillway						X		X					X	X	X
31. Ponds, reseed watershed/filter strip														X	X
32. Ponds, restock														X	X
33. Ponds, stop leaks						X		X					X	X	X
34. Ponds/wetlands, shallow water						X		X							
35. Roosting platforms/perch poles										X					
36. Root plowing	X		X	X			X	X		X	X	X	X		
39. Tillage, eliminate in fall						X	X			X		X	X		
42. Water control structures						X		X					X	X	X
43. Water developments for wildlife						X	X	X		X		X	X		

Hot Desert





Physical Description:

The terrain is relatively flat to rolling with isolated buttes and mountains. Annual precipitation varies from 2 to 25 inches depending on elevation, but seldom exceeds 5 inches over most of the region. Moisture is usually received in the form of short violent storms or cloudbursts in the summer and fall.

Summers are hot, winters cool. There are extreme differences in the daily high and low temperatures which encourage nightly dew formation. Where precipitation is low, dew formation is important as a water source for wildlife.

Dominant Vegetation:

Vegetation is sparse and dominated by cacti and thorny shrubs over most of the region. Depending on the location within the region, the most common plants are creosote bush, bur sage, chamise, paloverde, ocotillo, saguaro, bitterbrush, cholla, pinyon, and junipers.

Shrubs are often widely spaced with a few short annual grasses growing between them. After rains, many flowers and grasses appear, quickly go to seed and disappear until the next rain.

Vegetation associated with river and stream courses is often composed of different species and is more abundant than the surrounding areas. These riparian areas are dominated by cottonwoods, willows, tamarisk, Russian olive, and a variety of grasses and forbs. The abundance and variety of vegetation compared to the surrounding desert makes riparian areas very attractive to wildlife.

Farming and Ranching:

Water is diverted from large rivers such as the Colorado River to irrigate orchard, grain, hay, and vegetable crops. Irrigation water is expensive which encourages the use of modern irrigation systems that do not waste much water. When waste water is present, it supports a wide variety of vegetation and wetlands not common to this region. Wildlife species not normally associated with the desert are found in these areas.

Livestock grazing is an important use of this region where water is available or can be developed. Riparian and wetland areas are attractive for livestock grazing.

Plant Succession Stages:

Plant succession is not conspicuous in the desert. When vegetation is disturbed it is often replaced by the same type without intervening stages. Replacement of disturbed vegetation can take a long time because of the harsh environment.

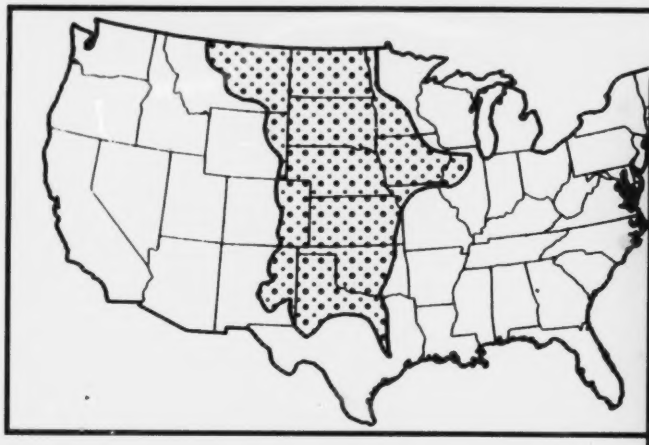
Species Recommended for Judging:

American kestrel
Black-throated sparrow
Crissal thrasher
Desert cottontail
Gambel's quail
Ladder-backed woodpecker
Mallard (winter habitat)
Mule deer
White-winged dove
Bluegill
Largemouth bass

Hot Desert

	American Kestrel	**Black-throated Sparrow**	Crissal Thrasher	Desert Cottontail	Gambel's Quail	**Ladder-backed Woodpecker**	Mallard (winter)	Mule Deer	White-winged Dove	**Bluegill**	Largemouth Bass
3. Brush piles				X	X						
7. Disking									X		
10. Grain, leave unharvested							X		X		
11. Harvest less				X	X		X	X	X	X	X
12. Harvest more				X	X		X	X	X	X	X
15. Livestock grazing management	X	X	X	X	X	X	X	X	X	X	X
16. Nesting boxes/structures/platforms	X										
17. Plant food plots				X					X		
18. Plant grass and legumes								X			
20. Plant trees or shrubs	X		X	X	X	X		X			
21. Ponds/lakes artificial reefs										X	X
22. Ponds, clear muddy water										X	X
23. Pond construction							X		X	X	X
24. Small dikes for temporary flooding							X				
25. Ponds, deepen edges										X	X
26. Ponds, determine balance										X	X
27. Ponds, diversion ditches										X	X
29. Ponds, remove trees near dike							X		X	X	X
30. Ponds, repair spillway							X		X	X	X
31. Ponds, reseed watershed/filter strip										X	X
32. Ponds, restock										X	X
33. Ponds, stop leaks							X		X	X	X
34. Ponds/wetlands, shallow water							X				
39. Tillage, eliminate in fall							X		X		
42. Water control structures							X		X	X	X
43. Water developments for wildlife		X	X		X		X	X	X		

Great Plains Grasslands



Tall-grass area in Eastern Great Plains

Physical Description:

The terrain is flat to rolling with occasional valleys, canyons, and buttes. Average annual precipitation ranges from 8 to 40 inches. Precipitation increases from east to west and is received primarily as summer rain and winter snow. Winters are cold, summers are hot.

Dominant Vegetation:

In undisturbed areas, climax vegetation in the Eastern Great Plains (or tall-grass prairie) is typically tall grasses such as various bluestems, wheatgrasses, Junegrass, needle grasses, panic grass, and prairie dropseed. A variety of forbs are also found. Native plum, snowberry, cottonwood, willow, and other shrubs and trees are often present in drainages, stream courses, and other moist areas.

Mixed-grass area in Central Great Plains

The Central Great Plains (or mixed-grass prairie area) consists of a mix of short, intermediate, and tall grasses. Tall grasses dominate moist sites such as flood plains and valleys. Dry sites such as hill tops and south facing slopes are characterized by short grass species. Transition sites (in-between areas) consist of a mixture of tall, mid and short grasses. In addition to the grass species mentioned previously, bluegrasses, prairie sandreed, grama grasses and various dropseeds are found in this area. Drainages and other moist areas may have shrubs and trees such as native plum, snowberry, cottonwood, and Russian olive.

Short-grass area in Western Great Plains

In the Western Great Plains (or short-grass prairie) climax vegetation typically consists of short grasses such as the gramas, buffalo grass, needlegrasses, and some wheatgrasses. In many areas, various species of shrubs such as sagebrush, greasewood, salt bush and winterfat are found mixed with the grasses. Loco weed, sunflowers and herbaceous sage are common forbs present in this area.

Within the entire Great Plains Grasslands Region there are large areas along major rivers and drainages dominated by trees and shrubs such as cottonwood, green ash, red maple, bur oak, American linden, Russian olive, box elder, eastern red cedar, and various willows. Due to the abundant vegetation and readily available water, these sites are very attractive to wildlife.

Depressions (potholes), caused by glaciation in the north and closed drainages (playas) in the south, fill with water, creating numerous lakes, ponds, and other wetlands that are extremely valuable to wildlife. These wetlands, especially the smaller ones, are susceptible to periodic droughts.

Pothole in Great Plains Grasslands

Farming and Ranching:

Cultivated cropland dominates much of this region. Where precipitation is adequate or where irrigation is possible, large areas are planted into agricultural crops such as barley, wheat, milo, millet, flax, oats, mustard, corn, sunflowers, and alfalfa. In the eastern part of the great plains and other areas where soil is fertile, the main crops are wheat, sugar beets, corn, soybeans, edible beans, and alfalfa.

Changes in farm machinery and management have produced large areas of cropland with little or no other types of vegetation available for use by wildlife. Recent irrigation water management techniques have reduced the amount of wetlands and riparian vegetation associated with irrigated crops. In the past, large areas of wetlands were drained or altered in some manner so crops could be grown.

Most of the native range is grazed by livestock except for a few locations where terrain is too rugged or water is unavailable.

Plant Succession Stages:

Stage 1 — bareground; Stage 2 — annual forbs and grasses; Stage 3 — perennial grasses and forbs; Stage 4 — shrubs occur most frequently on moist sites in mid and eastern areas, also found mixed with Stage 3 in western area; Stage 5 — young woodland; Stage 6 — mature woodland. Stages 5 and 6 are found along stream and river courses, and are more common in the eastern parts of the great plains. Stages 3 and/or 4 are usually the final stages of succession in this region.

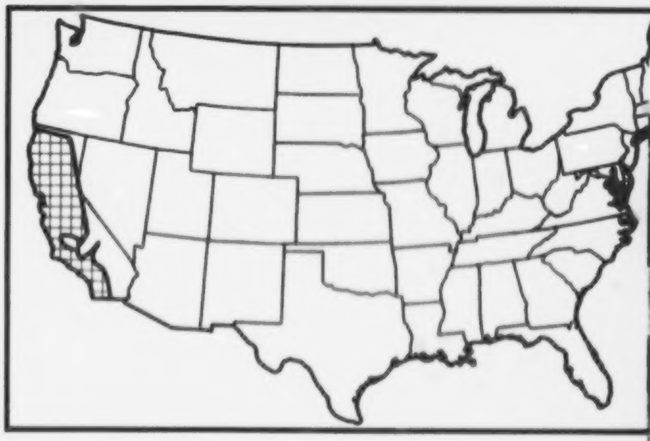
Species Recommended For Judging:

American kestrel
Brown thrasher
Eastern cottontail
Grasshopper sparrow
Gray partridge
Greater prairie chicken
Mallard (breeding and winter habitat)
Mourning dove
Mule deer
Pronghorn
Ring-necked pheasant
Sage grouse
Sharp-tailed grouse
Turkey
White-tailed deer
Largemouth bass
Bluegill

Great Plains Grasslands

	American Kestrel	Brown Thrasher	Eastern Cottontail	Grasshopper Sparrow	Gray Partridge	Greater Prairie Chicken	Mallard (breeding)	Mallard (winter)	Mourning Dove	Mule Deer	Pronghorn	Ring-necked Pheasant	Sage Grouse	Sharp-tailed Grouse	Turkey	White-tailed Deer	Largemouth Bass and Bluegill
[illegible] chopping (mowing)	X	X	X	X		X	X		X	X	X	X		X	X	X	
3. Brush piles			X														
4. Chaining/roller beating	X	X	X	X	X	X				X	X						
[illegible] (prescribed) burning	X	X	X	X	X	X	X		X	X	X	X		X	X	X	
8. Fertilize vegetation										X							
10. Grain, leave unharvested					X	X	X	X	X			X		X	X	X	
[illegible] less			X		X	X		X	X	X	X	X	X	X	X	X	X
12. Harvest more			X		X	X		X	X	X	X	X	X	X	X	X	X
13. Harvest timing				X	X	X	X					X		X			
[illegible] grazing management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16. Nesting boxes/structures/platforms	X						X		X								
17. Plant food plots			X		X	X			X			X		X	X	X	
[illegible] and legumes				X	X	X	X			X	X	X		X	X	X	
19. Plant mast trees															X	X	
20. Plant trees or shrubs	X	X	X		X				X	X		X		X	X	X	
[illegible] tools																	X
22. Ponds, clear muddy water																	X
23. Pond construction							X	X	X			X		X			X
[illegible] flooding							X	X									
25. Ponds, deepen edges																	X
26. Ponds, determine balance																	X
[illegible]																	X
28. Ponds, fertilize																	X
29. Ponds, remove trees near dike							X	X	X			X		X		X	X
[illegible]							X	X	X			X		X		X	X
31. Ponds, reseed watershed/filter strip																	X
32. Ponds, restock																	X
[illegible]							X	X	X			X		X		X	X
34. Ponds/wetlands, shallow water							X	X	X			X		X		X	
38. Tillage, delay in spring						X	X					X		X			
[illegible]						X	X	X	X			X		X	X	X	
42. Water control structures							X	X	X			X		X		X	X
43. Water developments for wildlife							X	X	X	X	X		X		X	X	

Mediterranean Zone



Physical Description:

The terrain includes gently to steeply sloping mountains, coastal plains, and interior valleys. Average annual precipitation ranges from 12 to 40 inches with most of it occurring in the winter as rain. Summers are hot and dry while winters are mild and rainy.

Dominant Vegetation:

There are three common but different vegetation types found in this region.

One is dominated by live oaks such as California live oak, canyon live oak, blue oak, Engelmann oak, and valley oak. The understory may be open and dominated by annual and perennial grasses or it may be shrubby.

One is dominated by annual grasses including wild oats, softchess, ripgut brome, red brome, wild barley and foxtail fescue. Forbs often found with the annual grasses are various filarees, turkey mullien, clovers, popcorn flower, California poppy, and many others.

The last type is dominated by shrubs such as buckbrush, manzanita, Christmasberry, and chamise often with little undergrowth.

Vegetation in river and stream courses is often composed of different species and more abundant than surrounding areas. These areas are dominated by Russian olive, cottonwood, valley oak, willow, and a variety of grasses and forbs. When compared to the surrounding area, the abundance and variety of vegetation and availability of water make these riparian areas very attractive to wildlife.

Farming and Ranching:

Agriculture is widespread and very diverse within this region. Stream valleys, coastal plains, and interior valleys are planted to a wide variety of truck crops, grain crops, orchards, vineyards, cotton, and hay.

Oak woodland — savanna

Shrub community

Annual grasslands

In the drier areas of the region, water must be diverted from rivers and streams to irrigate orchards, vineyards, citrus, hay, and grain crops. Irrigation water is expensive which encourages the use of modern irrigation systems that do not waste much water. Waste water, when present, often supports a wide variety of riparian vegetation and wetlands. In the moister areas, crops such as lemons, avocados, vegetables, and flowers are grown.

Where the slopes are not too steep and water is available, livestock grazing is an important use, especially in the live oak and annual grass areas.

Plant Succession Stages:

Oak Woodland: Stage 1 — bare ground; Stage 2 — annual forbs and grasses; Stage 3 — perennial grasses and forbs. Competition from introduced annual grasses often prevents this successional stage from occurring. Stage 4 — young oaks and open grassland or shrubby understory. Stage 5 — mature oaks and open grassland or shrubby understory.

Shrub Dominated Community: Stage 1 — bare ground; Stage 2 — scalebroom and other annual forbs and grasses; Stage 4 — shrubs, such as chamise, manzanita, etc. These shrubs often resprout after fires, so succession doesn't always revert to earlier stages after fires. Stage 3, perennial grasses and forbs, is often skipped in this community.

Annual Grasslands: Plant succession in the standard sense does not occur in this vegetation type. When vegetation is disturbed it is often replaced by the same kind of vegetation without intervening stages. Forbs that are important for wildlife are maintained among the dominant grasses by livestock grazing.

Species Recommended for Judging:

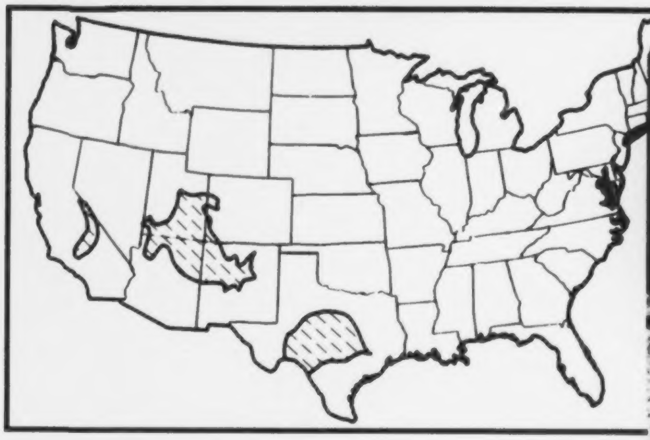
The species listed are not found in all of the vegetation types described. Use only those that are found in the vegetation type where you are working.

American kestrel
California quail
California thrasher
Desert cottontail
Grasshopper sparrow
Mallard (winter habitat)
Mourning dove
Mule deer
Nuttall's woodpecker
Raccoon
Ring-necked pheasant
Rufous-sided towhee
Western kingbird
Bluegill
Largemouth bass

Mediterranean Zone

	American Kestrel	**California Quail**	California Thrasher	Desert Cottontail	Grasshopper Sparrow	**Mallard (winter)**	Mourning Dove	Mule Deer	Nuttall's Woodpecker	**Raccoon**	Ring-necked Pheasant	Rufous-sided Towhee	Western Kingbird	**Bluegill**	Largemouth Bass
2. Brush chopping (mowing)	X	X	X	X	X		X	X		X		X	X		
3. Brush piles		X		X											
4. Chaining/roller beating	X	X	X	X			X	X		X		X	X		
5. Controlled (prescribed) burning	X	X	X	X	X		X	X		X	X	X	X		
7. Disking		X													
8. Fertilize vegetation								X							
10. Grain, leave unharvested		X				X	X			X	X				
11. Harvest less		X		X		X	X	X		X	X			X	X
12. Harvest more		X		X		X	X	X		X	X			X	X
13. Harvest timing					X						X				
15. Livestock grazing management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16. Nesting boxes/structures/platforms	X						X								
17. Plant food plots		X		X			X			X	X				
18. Plant grass and legumes					X			X			X		X		
20. Plant trees or shrubs	X	X	X	X			X	X	X	X	X	X	X		
21. Ponds/lakes artificial reefs														X	X
22. Ponds, clear muddy water														X	X
23. Pond construction						X	X			X	X			X	X
24. Small dikes for temporary flooding						X									
25. Ponds, deepen edges														X	X
26. Ponds, determine balance														X	X
27. Ponds, diversion ditches														X	X
29. Ponds, remove trees near dike						X	X			X	X			X	X
30. Ponds, repair spillway						X	X			X	X			X	X
31. Ponds, reseed watershed/filter strip														X	X
32. Ponds, restock														X	X
33. Ponds, stop leaks						X	X			X	X			X	X
34. Ponds/wetlands, shallow water						X				X	X				
35. Roosting platforms/perch poles		X													
38. Tillage, delay in spring											X				
39. Tillage, eliminate in fall		X				X	X				X				
42. Water control structures						X	X			X				X	X
43. Water developments for wildlife		X				X	X	X		X					

Woodland



Physical Description:

The terrain is irregular with large hills and mesas that are often dissected by narrow drainages. The average annual precipitation ranges from 10 to 25 inches. Most of the precipitation is received in winter and late summer. Summers have hot days and cool nights. Winters are cold.

Dominant Vegetation:

Juniper and/or pinyon trees are species most often associated with the final stages of succession. In the southern areas of this region, pinyon is absent and is replaced by species of oaks such as live oak, Spanish oak, and shin oak. Bitterbrush, mountain mahogany, scrub oak, and sumac are shrubs found in association with the dominant trees. In some areas in the south, the shrub mesquite becomes dominant after disturbance.

A variety of perennial and annual grasses and forbs can be found in the herbaceous layer. The amount of vegetation found in the shrub and herbaceous layers usually decreases as the amount of trees increases. Sometimes, sagebrush dominated areas are found interspersed with tree dominated areas similar to those described in the intermountain sagebrush region.

Vegetation associated with river and stream courses is often composed of different species and is more abundant than the surrounding areas. These riparian areas are dominated by cottonwood, willow, tamarisk, Russian olive, silver buffaloberry, box elder, and a variety of grasses and forbs in the north, and hackberry, Spanish oak and live oak in the south. The variety and abundance of vegetation compared to the surrounding areas makes riparian areas very attractive to wildlife.

Farming and Ranching:

Water for irrigation is limited and necessary to grow crops in this region. Where available, water is diverted from rivers and streams to grow crops such as corn, wheat, barley, alfalfa, and grass pasture and hay. Farming is important only in small localized areas in valleys and flat terrain.

Livestock grazing is a very important use where water is available. Riparian areas are particularly attractive for livestock grazing due to the availability of water and abundance of vegetation.

Plant Succession Stages:

Stage 1 — bare ground; Stage 2 — annual forbs and grasses; Stage 3 — perennial grasses and forbs; Stage 4 — shrubs; Stage 5 — young woodland; Stage 6 — mature woodland.

Species Recommended for Judging:

American kestrel
Black-capped chickadee
Desert or eastern cottontail
Mallard (winter habitat)
Mourning dove
Mule deer
Northern flicker
Raccoon
Red-tailed hawk
Rufous-sided towhee
Western or eastern bluebird
Bluegill
Largemouth bass

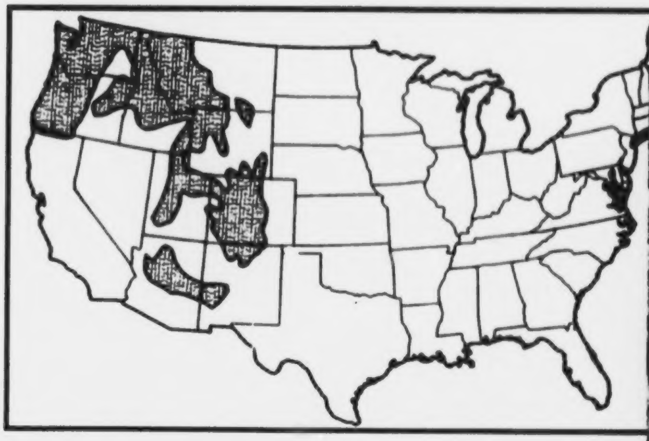
Additional Species for Texas:

Northern bobwhite
Turkey
White-tailed deer

Woodland

	American Kestrel	Black-capped Chickadee	Desert or Eastern Cottontail	Mallard (winter)	Mourning Dove	Mule Deer	Northern Bobwhite (In Texas)	Northern Flicker	Raccoon	Red-tailed Hawk	Rufous-sided Towhee	Turkey (In Texas)	Western or Eastern Bluebird	White-tailed Deer (In Texas)	Bluegill	Largemouth Bass
2. Brush chopping (mowing)	X		X		X	X	X		X	X	X	X	X	X		
3. Brush piles			X				X									
4. Chaining/roller beating	X		X		X	X	X		X	X	X	X	X	X		
5. Controlled (prescribed) burning	X		X		X	X	X		X	X	X	X	X	X		
7. Disking					X		X					X				
8. Fertilize vegetation						X										
10. Grain, leave unharvested				X	X		X		X			X		X		
11. Harvest less			X	X	X	X	X		X			X		X	X	X
12. Harvest more			X	X	X	X	X		X			X		X	X	X
14. Lime ponds and fields			X		X		X		X			X		X	X	X
15. Livestock grazing management	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
16. Nesting boxes/structures/platforms	X	X			X					X			X			
17. Plant food plots			X		X		X		X			X		X		
18. Plant grass and legumes						X						X		X		
19. Plant mast trees												X		X		
20. Plant trees or shrubs	X	X	X		X	X	X	X	X	X	X	X	X	X		
21. Ponds/lakes artificial reefs															X	X
22. Ponds, clear muddy water															X	X
23. Pond construction				X	X				X						X	X
24. Small dikes for temporary flooding				X												
25. Ponds, deepen edges															X	X
26. Ponds, determine balance															X	X
27. Ponds, diversion ditches															X	X
29. Ponds, remove trees near dike				X	X				X						X	X
30. Ponds, repair spillway				X	X				X						X	X
31. Ponds, reseed watershed/filter strip															X	X
32. Ponds, restock															X	X
33. Ponds, stop leaks				X	X				X						X	X
34. Ponds/wetlands, shallow water				X					X							
35. Roosting platforms/perch poles												X				
36. Root plowing (Texas only)	X		X		X		X		X	X		X	X	X		
39. Tillage, eliminate in fall				X	X		X					X		X		
40. Timber harvest, clear-cut	X		X		X	X	X	X	X	X	X	X	X	X		
41. Timber harvest, selective-cut		X	X				X	X	X			X		X		
42. Water control structures				X	X				X						X	X
43. Water developments for wildlife				X	X	X	X		X			X		X		

Intermountain - Foothills Zone



Physical Description:

The terrain varies from steep hills at the base of large mountains, to dissected plateaus, and flat valleys. Average annual precipitation is between 10 and 25 inches. Most of the moisture is received in the winter at higher elevations, and in the late summer at lower elevations. The summers are warm and the winters are moderately cold.

Dominant Vegetation:

This zone is found directly below the montane zone (in elevation) and is associated with most major mountain ranges in the western United States. The upper reaches of this region have many of the characteristics of the montane zone, while the lower reaches have similarities with the sagebrush zone. Typically the region is dominated by shrubs such as scrub oaks, mountain mahogany, serviceberry, bitterbrush, manzanita, buckbrush, and sagebrush. Perennial grasses and many different forbs are also common. Occasionally aspen and ponderosa pine may be found on moist sites. In the southern areas of this region pinyon and juniper trees are found on drier sites.

As with most of the regions in the arid West, the vegetation associated with rivers and streams is often composed of different species and is more abundant than the surrounding areas. These riparian areas are dominated by cottonwood, willow, tamarisk, Russian olive, sumac, silver buffaloberry, and a variety of grasses and forbs. The abundance and variety of vegetation and the availability of water make these areas very attractive to wildlife.

Farming and Ranching:

In the valleys and other areas where slopes are gentle, water, when available, is diverted to irrigate crops. Grass, alfalfa, and oats are the most common crops.

The terrain often makes management of irrigation water difficult. Water that runs off irrigated fields and leaks out of earthen delivery ditches often creates wetlands and/or supports vegetation similar to that found in riparian areas. In some areas, non-irrigated crops such as wheat and barley are grown. Unless the slopes are extremely steep, most of this region is used for livestock grazing. Cattle and sheep are the most common grazers.

Plant Succession Stages:

Stage 1 — bare ground; Stage 2 — annual forbs and grasses; Stage 3 — perennial grasses and forbs; Stage 4 — shrubs. Succession does not always revert to earlier stages from disturbance by fire as many of these shrubs resprout after fire.

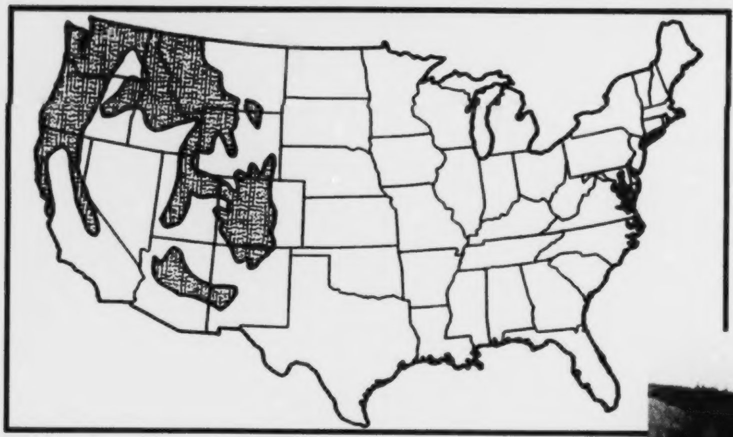
Species Recommended for Judging:

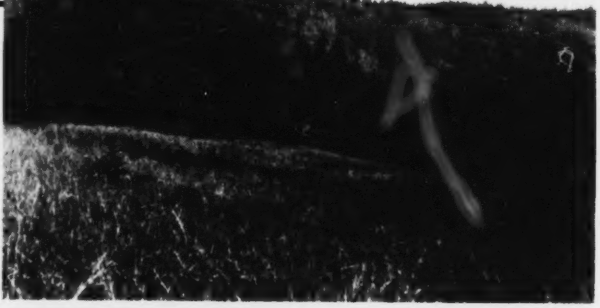
American kestrel
Blue grouse
Mallard (breeding habitat)
Mallard (winter habitat)
Mountain cottontail
Mourning dove
Mule deer
Northern flicker
Red-tailed hawk
Rufous-sided towhee
Turkey
Wapiti (Elk)
Rainbow trout

Intermountain Foothills Zone

	American Kestrel	Blue Grouse	Mallard (breeding)	Mallard (winter)	Mountain Cottontail	Mourning Dove	Mule Deer	Northern Flicker	Red-tailed Hawk	Rufous-sided Towhee	Turkey	Wapiti (Elk)	Rainbow Trout		
2. Brush chopping (mowing)	X	X			X	X	X		X	X	X	X			
3. Brush piles					X										
4. Chaining/roller beating	X	X			X	X	X		X	X	X	X			
5. Controlled (prescribed) burning	X	X	X		X	X	X		X	X	X	X			
6. Dams, rock or log													X		
8. Fertilize vegetation							X					X			
9. Fish rocks													X		
10. Grain, leave unharvested			X	X		X					X				
11. Harvest less		X		X	X	X	X				X	X	X		
12. Harvest more		X		X	X	X	X				X	X	X		
13. Harvest timing			X												
15. Livestock grazing management	X	X	X	X	X	X	X	X	X	X	X	X	X		
16. Nesting boxes/structures/platforms	X		X			X			X						
17. Plant food plots					X	X					X				
18. Plant grass and legumes			X				X				X	X			
20. Plant trees or shrubs	X				X	X	X	X	X	X	X				
21. Ponds/lakes artificial reefs													X		
22. Ponds, clear muddy water													X		
23. Pond construction			X	X		X							X		
24. Small dikes for temporary flooding			X	X											
25. Ponds, deepen edges													X		
26. Ponds, determine balance													X		
27. Ponds, diversion ditches													X		
29. Ponds, remove trees near dike			X	X		X							X		
30. Ponds, repair spillway			X	X		X							X		
31. Ponds, reseed watershed/filter strip													X		
32. Ponds, restock													X		
33. Ponds, stop leaks			X	X		X							X		
34. Ponds/wetlands, shallow water			X	X											
35. Roosting platforms/perch poles									X						
37. Stream, determine balance													X		
38. Tillage, delay in spring			X												
39. Tillage, eliminate in fall			X	X		X					X				
40. Timber harvest, clear-cut	X	X			X	X	X	X	X	X	X	X			
41. Timber harvest, selective-cut								X			X	X			
42. Water control structures			X	X		X							X		
43. Water developments for wildlife			X	X		X	X				X	X			

Intermountain - Montane Zone and Pacific Forest





Physical Description:

The terrain includes high rugged mountains of volcanic and uplisted origin, and in places, a narrow coastal plain. Average annual precipitation is high, ranging from 30 to 150 inches. The majority of moisture comes in the winter and early spring.

Dominant Vegetation:

Final stages of plant succession is typically dense coniferous forest. Depending on the location, western hemlock, silver spruce, redwood, Douglas fir, incense cedar, and ponderosa pine are species associated with climax or final successional stages. Aspen and lodgepole pine are not considered to be climax species, but they dominate large areas for long periods of time in the Rocky Mountains at the higher elevations of this region. In the northern reaches of this region, silver fir, Sitka spruce, and Alaskan cedar are common.

In mature forests, shrub and herbaceous layers are poorly developed. In openings, dense growths of shrubs may be found such as salal, vine maple, salmon berry, and devil's club in the Northwest and northern Rocky Mountains. Serviceberry, chokecherry, scrub oak, mountain mahogany, ceanothus, and snowberry are found in the central and southern Rocky Mountains; manzanita, buckbrush, sticky laurel, currant, waxberry and buckthorn, in the Sierra Nevada Mountains. Perennial grasses and a variety of forbs are also common in open areas.

Farming and Ranching:

In the larger valleys, water is diverted from nearby streams and rivers to irrigate grass hay. Except in the Pacific Northwest, the short growing season usually prevents the cultivation of other types of crops.

Where the slopes are not too steep, livestock grazing is a very important use of this region. Open areas dominated by shrubs and grasses, as well as areas adjacent to rivers and streams, are used most often for grazing.

In some of the Pacific Coast areas, crops such as corn, small grains, fruits, and alfalfa are grown in the valleys and other areas cleared of native vegetation. Steep slopes often prevent the annual cultivation of many deforested areas. Coastal grasslands and meadows within the redwood forests are used primarily for dairies and livestock grazing.

Plant Succession Stages:

Stage 1 — bare ground; Stage 2 — annual forbs and grasses; Stage 3 — perennial grasses and forbs; Stage 4 — shrubs, aspen in some areas; Stage 5 — young coniferous forest; Stage 6 — mature coniferous forest.

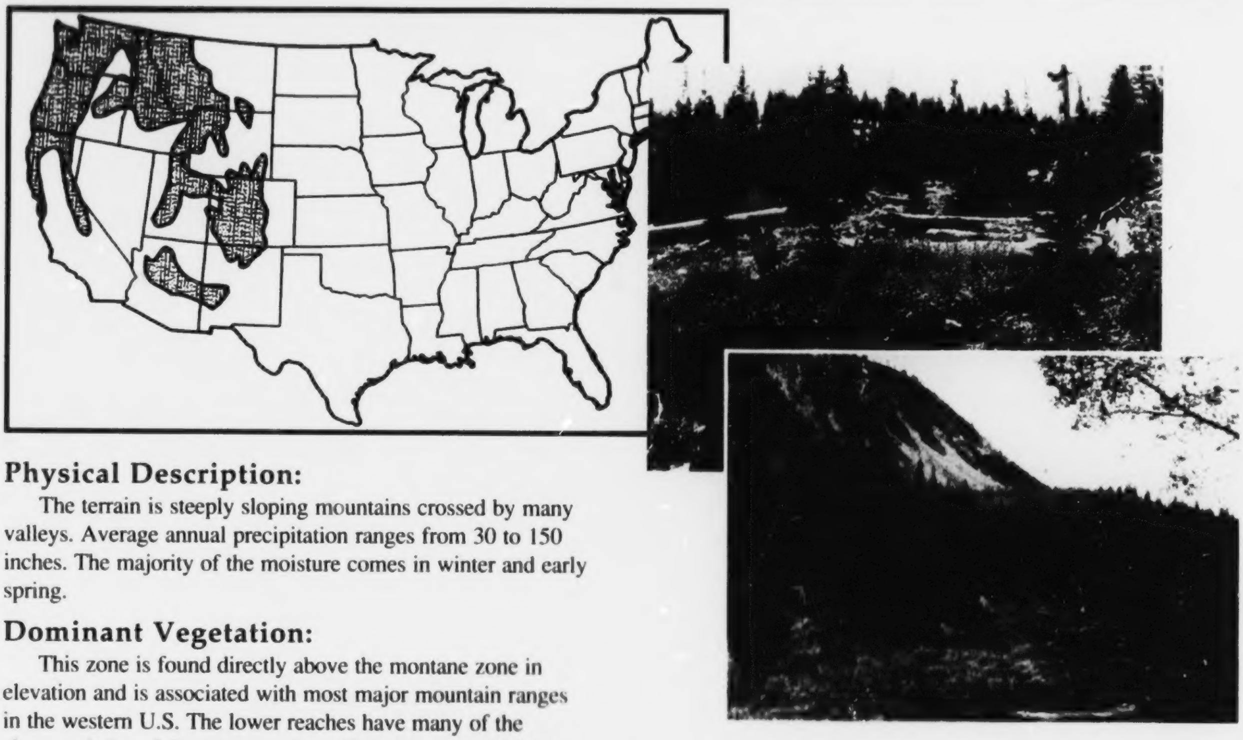
Species Recommended for Judging:

Blue grouse
Hairy woodpecker
Mallard (breeding and winter habitat)
Mule deer
Northern goshawk
Red-tailed hawk
Rufous-sided towhee
Turkey
Yellow-rumped warbler
Wapiti (Elk)
Rainbow trout

Intermountain Montane Zone and Pacific Forest

	Blue Grouse	Hairy Woodpecker	Mallard (breeding)	Mallard (winter)	Mule Deer	Northern Goshawk	Red-tailed Hawk	Rufous-sided Towhee	Turkey	Yellow-rumped Warbler	Wapiti (Elk)	Rainbow Trout		
2. Brush chopping (mowing)	X				X		X	X	X		X			
4. Chaining/roller beating	X				X		X	X	X		X			
5. Controlled (prescribed) burning	X		X		X		X	X	X		X			
6. Dams, rock or log												X		
8. Fertilize vegetation					X						X			
9. Fish rocks												X		
10. Grain, leave unharvested			X	X					X					
11. Harvest less	X			X	X				X		X	X		
12. Harvest more	X			X	X				X		X	X		
13. Harvest timing			X											
15. Livestock grazing management	X	X	X	X	X	X	X	X	X	X	X	X		
16. Nesting boxes/structures/platforms			X				X							
17. Plant food plots									X					
18. Plant grass and legumes			X		X				X		X			
20. Plant trees or shrubs		X			X	X	X	X	X					
21. Ponds/lakes artificial reefs												X		
22. Ponds, clear muddy water												X		
23. Pond construction			X	X								X		
24. Small dikes for temporary flooding			X	X										
25. Ponds, deepen edges												X		
26. Ponds, determine balance												X		
27. Ponds, diversion ditches												X		
29. Ponds, remove trees near dike			X	X								X		
30. Ponds, repair spillway			X	X								X		
31. Ponds, reseed watershed/filter strip												X		
32. Ponds, restock												X		
33. Ponds, stop leaks			X	X								X		
34. Ponds/wetlands, shallow water			X	X										
35. Roosting platforms/perch poles							X							
37. Stream, determine balance												X		
38. Tillage, delay in spring			X											
39. Tillage, eliminate in fall			X	X					X					
40. Timber harvest, clear-cut	X				X		X	X	X		X			
41. Timber harvest, selective-cut						X			X	X	X			
42. Water control structures			X	X								X		
43. Water developments for wildlife			X	X	X				X		X			

Intermountain - Subalpine Zone



Physical Description:

The terrain is steeply sloping mountains crossed by many valleys. Average annual precipitation ranges from 30 to 150 inches. The majority of the moisture comes in winter and early spring.

Dominant Vegetation:

This zone is found directly above the montane zone in elevation and is associated with most major mountain ranges in the western U.S. The lower reaches have many of the characteristics of the montane zone. The climax vegetation is typically dense coniferous forest. In the Sierra Nevada Mountains, mountain hemlock, California red fir, western white pine, and whitebark pine dominate. In the Rocky Mountains, subalpine fir, and Engelmann spruce dominate. In the Gila Mountains, Engelmann spruce, and corkbark fir dominate. Lodgepole pine is found in areas throughout the region and is usually considered a sub-climax species although at times it has the more permanent characteristics of final successional stage vegetation.

The understory vegetation usually consists of elk sedge, a variety of forbs, and low growing shrubs like vaccinium, elderberry, bearberry honeysuckle, currant, and russet buffaloberry. Where the forest canopy is dense, understory plants are sparse. Aspen are found in early stages of plant succession.

Moist subalpine meadows dominated by grasses, sedges, and forbs such as purple reedgrass, alpine fescue, slender wheatgrass, falsebulrush sedge, whiproot clover, and bistort are scattered throughout this region. In high mountain valleys, streams and bogs are surrounded by thick stands of willow and subalpine meadow vegetation.

Farming and Ranching:

An extremely short growing season prohibits the cultivation of most types of crops. In some areas water is diverted from streams to irrigate high mountain meadows for grass and sedge hay production. Livestock grazing is important in localized areas and is usually restricted to the mountain meadows and aspen stands. Steepness of slopes often dictates where grazing is feasible.

Plant Succession Stages:

Stage 1 — bare ground; Stage 2 — annual forbs; Stage 3 — perennial grasses and sedges; Stage 4 — aspen and shrubs; Stage 5 — young coniferous forest; Stage 6 — mature coniferous forest. On extremely moist sites succession does not usually develop past stage 4. On dry sites such as steep slopes with southern exposure, succession does not usually develop past stage 3 or 4.

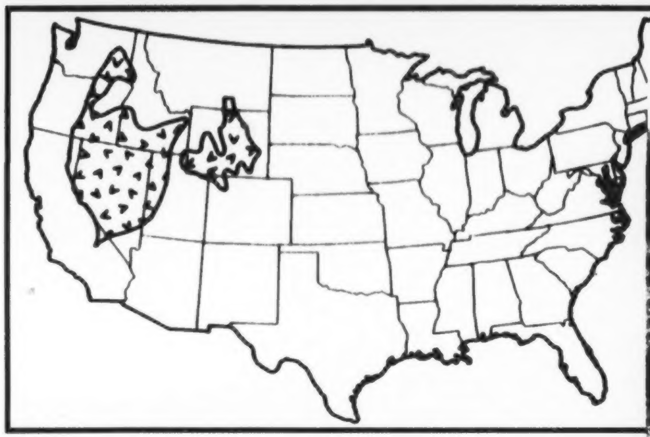
Species Recommended for Judging:

Black-capped chickadee
Blue grouse
Hairy woodpecker
Mallard (breeding habitat)
Marten
Mule deer
Northern goshawk
Red squirrel
Varying hare
Wapiti (Elk)
Yellow-rumped warbler
Rainbow trout

Intermountain Subalpine Zone

	Black-capped Chickadee	Blue Grouse	Hairy Woodpecker	Mallard (breeding)	Marten	Mule Deer	Northern Goshawk	Red Squirrel	Varying Hare	Wapiti (Elk)	Yellow-rumped Warbler	Rainbow Trout
2. Brush chopping (mowing)		X				X				X		
3. Brush piles									X			
4. Chaining/roller beating		X				X				X		
5. Controlled (prescribed) burning		X		X		X				X		
6. Dams, rock or log												X
9. Fish rocks												X
11. Harvest less		X		X	X	X			X	X		X
12. Harvest more		X		X	X	X			X	X		X
13. Harvest timing				X								
14. Lime ponds and fields												X
15. Livestock grazing management	X	X	X	X	X	X	X	X	X	X	X	X
16. Nesting boxes/structures/platforms	X											
18. Plant grass and legumes				X		X				X		
20. Plant trees or shrubs	X		X								X	
21. Ponds/lakes artificial reefs												X
22. Ponds, clear muddy water												X
23. Pond construction				X								X
24. Small dikes for temporary flooding				X								
25. Ponds, deepen edges												X
26. Ponds, determine balance												X
27. Ponds, diversion ditches												X
29. Ponds, remove trees near dike				X								X
30. Ponds, repair spillway				X								X
31. Ponds, reseed watershed/filter strip												X
32. Ponds, restock												X
33. Ponds, stop leaks				X								X
34. Ponds/wetlands, shallow water				X								
37. Stream, determine balance												X
40. Timber harvest, clear-cut		X				X				X		
41. Timber harvest, selective-cut	X				X		X	X	X	X	X	
42. Water control structures				X								X
43. Water developments for wildlife				X		X				X		

Intermountain - Sagebrush Zone



Physical Description:

The terrain includes large, undulating hills within small interior basins that are often surrounded by mountains.

Annual precipitation averages from 5 to 20 inches and occurs most often in the winter and spring. The summers are hot and the winters are moderately cold.

Dominant Vegetation:

In final stages of plant succession, sagebrush dominates the lower elevations of the native rangeland along with other shrubs such as shadscale, fourwing saltbush, rabbitbrush, and horsebrush. Perennial grasses such as various wheatgrasses, needlegrasses, and blue grasses are common and intermixed with the shrubs to varying degrees. Many forbs such as lupines, buckwheats, and mallows are also present.

Riparian vegetation is often much different than the surrounding vegetation, and is dominated by cottonwoods, willows, tamarisk, Russian olive, silver buffaloberry, and a variety of grasses and forbs. The abundance of vegetation, availability of water, and variety of vegetation make riparian zones very attractive to wildlife.

Farming and Ranching:

Water is diverted from nearby streams and rivers to irrigate crops such as corn, barley, wheat, and alfalfa in the lower elevations and grass hayland at higher elevations. The terrain often makes management of irrigation water difficult. Water that runs off irrigated fields and leaks out of earthen delivery ditches often creates wetlands and/or supports vegetation similar to that found in riparian areas which is attractive to a variety of wildlife species.

In areas where irrigation water is not available and terrain and climate permit, the native rangeland has been converted to non-irrigated cropland. Small grains such as barley and wheat are the most common crops. Near croplands are areas that are not cultivated and remain in native vegetation. This mix of dry cropland and rangeland is important to many species of wildlife.

There are large areas of shrubs and grasslands in this region that are primarily used for livestock grazing. In the winter, large herds of domestic sheep often use rangelands within this region.

Plant Succession Stages:

Stage 1 — bare ground; Stage 2 — annual forbs and grasses; Stage 3 — perennial grasses and forbs; Stage 4 — shrubs, and perennial grass and forb mix. In stage 4, brush seems to dominate on the drier sites while grasses are more common on the moister sites. Continual overgrazing of perennial grasses can produce a stage 4 that is dominated almost entirely by shrubs.

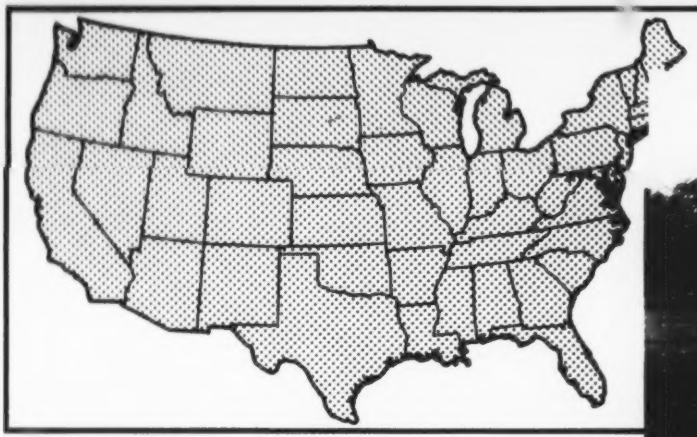
Species Recommended for Judging:

American kestrel
Brewer's sparrow
Desert cottontail
Mallard (breeding and winter habitat)
Mourning dove
Mule deer
Northern flicker
Pronghorn
Red-tailed hawk
Ring-necked pheasant
Sage grouse
Sage thrasher
Rainbow trout

Intermountain Sagebrush Zone

	American Kestrel	Brewer's Sparrow	Desert Cottontail	Mallard (breeding)	Mallard (winter)	Mourning Dove	Mule Deer	Northern Flicker	Pronghorn	Red-tailed Hawk	Ring-necked Pheasant	Sage Grouse	Sage Thrasher	Rainbow Trout
2. Brush chopping (mowing)	X		X			X	X		X	X				
3. Brush piles			X											
4. Chaining/roller beating	X		X			X	X		X	X				
5. Controlled (prescribed) burning	X		X	X		X	X		X	X	X			
6. Dams, rock or log														X
7. Disking						X								
8. Fertilize vegetation							X							
9. Fish rocks														X
10. Grain, leave unharvested				X	X	X					X			
11. Harvest less			X		X	X	X		X		X	X		X
12. Harvest more			X		X	X	X		X		X	X		X
13. Harvest timing				X							X			
15. Livestock grazing management	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16. Nesting boxes/structures/platforms	X			X		X				X				
17. Plant food plots			X			X					X			
18. Plant grass and legumes				X			X		X		X			
20. Plant trees or shrubs	X		X			X	X	X		X				
21. Ponds/lakes artificial reefs														X
22. Ponds, clear muddy water														X
23. Pond construction				X	X	X					X			X
24. Small dikes for temporary flooding				X	X									
25. Ponds, deepen edges														X
26. Ponds, determine balance														X
27. Ponds, diversion ditches														X
29. Ponds, remove trees near dike				X	X	X					X			X
30. Ponds, repair spillway				X	X	X					X			X
31. Ponds, reseed watershed/filter strip														X
32. Ponds, restock														X
33. Ponds, stop leaks				X	X	X					X			X
34. Ponds/wetlands, shallow water				X	X						X			
35. Roosting platforms/perch poles										X				
37. Stream, determine balance														X
38. Tillage, delay in spring				X							X			
39. Tillage, eliminate in fall				X	X	X					X			
42. Water control structures				X	X	X					X			X
43. Water developments for wildlife				X	X	X	X		X			X		

Urban Areas



Physical Description:

Urban landscapes have been broken down into seven categories. At least some of these categories are applicable to nearly all urban areas in the United States.

As with the other regions, vegetation takes on layering characteristics, trees being the highest canopy, shrubs the next highest, and herbaceous forbs and grasses the lowest.

Additional characteristics of urban areas that can be important to wildlife are the height and age of buildings and how vegetation is located around them. The precipitation and climate vary, but irrigation and landscaping produce urban areas with similar habitat.

Categories:

Urban Forests: All of the vegetation and buildings of a city are looked upon as a single unit from the perspective of the animal's habitat requirements and overall management.

Corridors: Contain habitat sufficient to enable wildlife to travel within a yard or among various habitats that may be interspersed within an urban area. Corridors are often adjacent to streams that flow through urban areas and are relatively free from interruption by buildings. A tree-lined street could also be a corridor for many species of wildlife.

Neighborhood Parks, School Grounds, and Golf Courses: Intermediate sized open areas that may already attract wildlife or can be managed to enhance habitat in addition to the primary uses.

Vacant Land: Lots without buildings and designated open space associated with a town or city can provide useful habitat. These can be large or small spaces, with or without alterations by humans.

Residential Areas: Individual homes are areas where animals can be attracted by the habitat provided in a single yard or all the yards combined. The age of a residential area can be of significance to plants and for animals using the area. More established areas tend to have trees, shrubs, and other vegetation that is mature and can offer benefits to wildlife.

Apartment and Business Lots: These areas commonly have balconies and window ledges with outside access and small grounds beneath the large buildings.

Inner City: Characterized by tall buildings with high roof tops, ledges, and little vegetation.

Species Recommended for Judging:

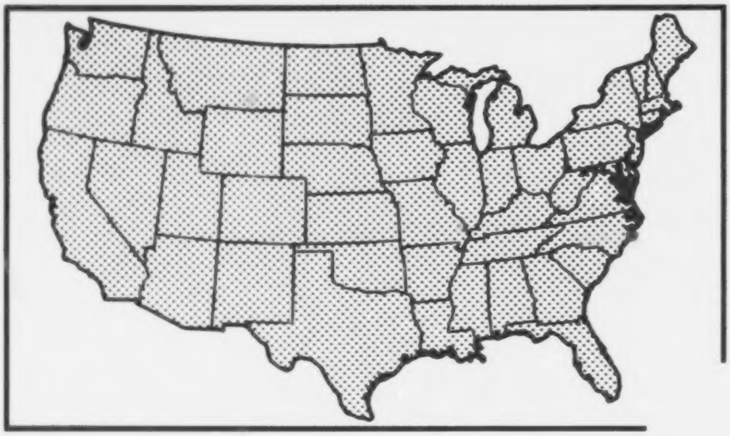
- American robin
- Butterflies
- Common or lesser nighthawk
- Cottontail
- Eastern fox squirrel
- European starling
- Frogs
- House finch
- House sparrow
- House wren
- Hummingbirds
- Northern flicker
- Raccoon
- Rock dove (pigeon)
- Song sparrow

Urban

	American Robin	**Butterflies**	Common or Lesser Nighthawk	Cottontail	Eastern Fox Squirrel	**European Starling*** **	Frogs	House Finch	**House Sparrow*** **	**House Wren**	Hummingbirds	Northern Flicker	Raccoon	**Rock Dove (Pigeon)*** **	Song Sparrow
1. Artificial feeders								X	X		X	X		X	X
2. Brush piles				X											
16. Nesting boxes/structures/platforms	X				X	X				X					
17. Plant food plots				X	X								X		
19. Plant mast trees					X										
20. Plant trees or shrubs	X	X		X	X	X		X	X	X	X	X	X		X
23. Pond construction							X						X		
34. Ponds/wetlands, shallow water							X						X		
42. Water control structures							X						X		
43. Water developments for wildlife	X	X			X	X		X	X				X		X
Additional urban region only practices															
Do not disturb nesting places			X					X	X	X	X				X
Plant flowers		X									X				
Rooftop/balcony gardens		X									X				
Use insecticides carefully	X	X	X				X			X	X	X			X

***** These species were introduced to the U.S. from Europe and in many places are considered pests as they out-compete native species for available habitat. In such situations management objectives may be to reduce the quantity and quality of habitat available for these species. In areas such as the inner city, management may be limited to these and a few other species.**

Wetlands



Physical Description:

Wetlands can be described as the zone between deep water and upland habitats. They are characterized by various amounts of open water, aquatic vegetation, and soil that is often wet or covered with shallow water.

There are many different types of wetlands including beaver ponds, potholes, playas, man-made ponds, small lakes, marshes, rivers, streams, and swamps. They are found in all of the previously mentioned regions.

Dominant Vegetation:

To describe wetland vegetation, the distinction between aquatic vegetation and upland vegetation must be made.

Aquatic Vegetation can survive in the water or on lands, flooded or saturated with water for extended lengths of time.

Upland Vegetation cannot tolerate areas saturated or flooded with water for long periods.

The vegetation found in association with wetlands varies depending on factors such as permanence of the water, depth of water, salinity, and the substrate (bottom).

Wetlands with deep permanent water typically have less emergent aquatic (above the water surface) vegetation and more floating or submerged (below the water surface) aquatic vegetation. As the water depth decreases, emergent aquatic vegetation becomes more dominant.

Less vegetation is found on rock and gravel bottoms than on bottoms that have characteristics more like those of soil such as the presence of silt, clay, and organic (dead plants and animals that are decomposed) matter.

Emergent aquatic vegetation includes trees, shrubs, grass and grasslike plants. Some examples of trees often found in wetlands are willows, cottonwood, oaks, various gum trees, tamarack, cypress, mangroves, red bay, black spruce, Atlantic white cedar, and pond pine.

Stage 1 — wetland

Shrubs commonly found in and adjacent to wetlands include willows, alders, bog birch, bog laurel, Labrador tea, coastal sweetbells, inkberry, sea myrtle, and marsh elder.

Grass and grass-like vegetation such as cattails, bulrushes, saltgrass, cordgrass, saw grass, sedges, arrow grass, shoal grass, eel grass and wild rice are also examples of emergent aquatic vegetaion found in wetlands.

Water lilies, pond weeds, wild celery, water milfoil, duckweeds, and coontails are examples of floating and submerged aquatic vegetation.

The amount of open water and vegetation is important in determining how suitable the wetland is for different wildlife species. For instance, young ducks need open water for protection from predators. They also need emergent vegetation for hiding. Floating and submerged vegetation supports large amounts of food high in protein such as snails, mollusks, and crustaceans that the young ducks need for fast growth.

Emergent vegetation may supply nesting areas such as trees for wood ducks, grass for mallards, and cattails for red-winged black birds and muskrats.

Wetlands that have stable, non-flowing water levels go through successional stages of vegetation development similar

Stage 2 — wetland

Stage 3 — wetland

Stage 4 — wetland

to those found on adjacent upland areas. The open water areas fill in with silt and dead vegetation allowing emergent aquatic vegetation to become dominant. As the wetland continues to fill in, it becomes drier, allowing upland vegetation to become dominant.

Plant Succession Stages:

Typically succession would proceed in the following order: Stage 1 — deep water with little vegetation; Stage 2 — shallow water dominated by submerged and floating aquatic vegetation; Stage 3 — very shallow water or wet ground dominated by any variety of emergent aquatic vegetation; Stage 4 — ground becomes drier and upland vegetation similar to the surrounding area becomes dominant.

This type of succession proceeds slowly in wetlands with large amounts of deep water or a rocky bottom. Fluctuations in water level can cause final stages of this succession to regress to earlier stages.

For instance, if a wetland in stage 3 of succession is flooded with deep water for a period of time, the aquatic emergent vegetation may die leaving a wetland in stage 1 or 2 of succession.

The extent of this regression depends on the length of time the wetland is flooded with deep water, how much the water level changes, and the extent (length of time) that the present vegetation can survive in the changed water level.

Management of water levels is an important tool in managing wetlands for wildlife habitat. The succession process described above is often not applicable to wetlands with constantly moving water such as rivers, streams, and tidal areas.

Species Recommended for Judging:

Beaver
Bullfrog
Canada goose (breeding habitat)
Mallard (breeding habitat)
Mink
Muskrat
Raccoon
Redhead
Red-winged blackbird
Wood duck

Wetlands

	Beaver	**Bullfrog**	Canada Goose (breeding)	Mallard (breeding)	Mink	**Muskrat**	Raccoon	Redhead	**Red-winged Blackbird *****	**Wood Duck**
2. Brush chopping (mowing)			X	X	X	X	X	X	X	
5. Controlled (prescribed) burning			X	X	X	X	X	X	X	
11. Harvest less	X	X			X	X	X	X		X
12. Harvest more	X	X			X	X	X	X		X
13. Harvest timing				X						
15. Livestock grazing management	X	X	X	X	X	X	X	X	X	X
16. Nesting boxes/structures/platforms			X	X						X
18. Plant grasses and legumes			X	X				X		X
19. Plant mast trees										X
20. Plant trees or shrubs	X						X		X	X
23. Pond construction		X	X	X	X	X	X	X	X	X
24. Small dikes for temporary flooding			X	X	X	X	X	X	X	X
29. Ponds, remove trees near dike		X	X	X	X	X	X	X	X	X
30. Ponds, repair spillway		X	X	X	X	X	X	X	X	X
33. Ponds, stop leaks		X	X	X	X	X	X	X	X	X
34. Ponds/wetlands shallow water		X	X	X	X	X	X	X	X	X
41. Timber harvest, selective-cut							X			
42. Water control structures		X	X	X	X	X	X	X	X	X

***** This species is often a pest in agricultural areas. In such situations management objectives may be to reduce the quality and quantity of habitat. It is often more appropriate to manage for this species in urban wetlands and areas where agricultural crops are not commonly grown.**

Wildlife Species

This section discusses habitat requirements and practices useful for managing habitat for the birds, mammals, and other species listed in the *Regions* section. You should find and mark species for your area, then begin to learn about their needs and the appropriate management techniques.

Not all of the practices are applicable in every area. Wildlife managers must decide which practices are appropriate for their specific area.

Reading additional materials and experience in the field are recommended for making "good" habitat management decisions. Learning the information in this section for the appropriate species in your regions is a good place to start. Published field guides to North American birds and mammals are good sources to see what the species look like and to learn more about them.

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Birds

American Kestrel

General Habitat Preference:

Stages 2 and 3 of plant succession for feeding, and stages 4, 5, and 6 for nesting. Large open areas where adequate nesting sites are available.

Habitat Requirements:

Food: Primarily insects and small mammals associated with open areas.

- Brush chop, chain, or roller beat small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 4 (shrub) vegetation.
- Control burn small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 4 (shrub) vegetation.
- Clear-cut small areas in large expanses of stage 5 and 6 woodlands.
- Livestock grazing management should leave enough herbaceous canopy to support insects and small rodents.

Cover: Kestrels nest in tree cavities and other sites including holes in cliffs, canyon walls, and artificial nesting boxes.

Maintain areas of stage 5 and 6 vegetation interspersed with stage 2 and 3 vegetation.

- Plant trees in large open areas (irrigate if necessary) on idle lands.
- Provide kestrel nesting boxes in areas lacking adequate nesting cavities. Boxes can be placed on fence posts in open areas.
- Manage livestock grazing to maintain trees in riparian areas.

Water: Obtain necessary water from diet, do not need water for drinking.

American Robin

General Habitat Preference:

Urban settings with large open areas and nearby trees and shrubs. Parks, golf courses and lawns in residential areas are favorites.

Habitat Requirements:

Food: Insects and worms in warm seasons. Fruits and berries from shrubs and trees in winter. Do not often use artificial feeders.

- Plant fruit and berry producing shrubs such as sumac, Nanking cherry, golden currant, and Russian olive.

Leave open areas of short grass and forbs.

- Use insecticides only when necessary. When using insecticides, carefully follow the instructions given on the label.

Cover: Nesting sites and hiding areas in shrubs, evergreen trees, and broad-leaf trees. Evergreen trees are preferred for early nests. Will use nesting platforms.

- Plant and maintain trees and shrubs. Include some evergreen trees in plantings.
- Provide nesting platforms in areas lacking nest sites.

Water: Require water daily in warm seasons. Obtain water from yard irrigation, rain filled gutters, low lying areas, ponds, etc.

- Birdbaths and pans of water can be provided. Do not place water in areas where cats and other pets can catch the birds.

Black-capped Chickadee

General Habitat Preference:

Stages 4, 5, and 6 of plant succession.

Habitat Requirements:

Food: Insects and spiders gleaned from the branches and boles of shrubs and trees. Seeds and nuts of shrubs and trees are eaten in winter.

- Selective-cut timber in stage 5 and 6 woodlands when tree canopy closure exceeds 80 percent. Optimum canopy closure is between 50 percent and 75 percent.
- Plant softwood trees and shrubs (shelterbelts, hedgerows, field borders). *Usually not necessary in Subalpine Region.*

Cover: Nest in cavities, usually in a dead or hollow tree. Can excavate a cavity only in soft wood or rotted wood. Will use woodpecker holes, natural cavities, and man-made boxes. Thick shrub and tree canopies provide hiding cover.

If selective-cut timber management is used, leave 3 snags per acre.

- Provide nesting boxes in young forests or areas where nesting cavities are not available.

Water: Obtain necessary water from snow and surface water, usually in sufficient supply.

- In summer these birds are attracted to watering facilities such as birdbaths in urban areas.

Black-throated Sparrow

General Habitat Preference:

Associated with mesquite shrublands and desert shrubs and cacti.

Habitat Requirements:

Food: Insects and green herbaceous vegetation in spring and summer. Seeds of herbaceous plants in winter. Conversion of natural desert vegetation to urban and agricultural areas reduces the amount of desirable habitat.

Maintain blocks of stage 4 vegetation in mesquite shrublands and natural vegetation in the desert.

Cover: Nests are placed in small shrubs near the ground. They are made out of small twigs, grass, and forb stems. Shrubs and cacti are used for hiding cover.

As with food, maintenance of natural desert vegetation and stage 4 vegetation in mesquite shrublands will provide cover for this species.

- Livestock grazing can be used to promote shrub growth used by this species.

Water: Require water frequently during dry and cool seasons when green herbaceous vegetation and insects are not available for diet.

- Water developments made for livestock and other wildlife species are beneficial for this species.

Blue Grouse

General Habitat Preference:

Stages 3 and 4 of plant succession in summer. Stages 5 and 6 of plant succession in winter.

Habitat Requirements:

Food: Changes seasonally. Late spring to early fall eat fruits, seeds, green leafage, and some insects. Late fall to early spring eat leaves (needles) of coniferous trees.

- Clear-cut small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 5 and 6 forests.
- Brush chop, chain, roller beat or control (prescribe) burn small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 4 vegetation to maintain stage 3 and 4 vegetation.

Maintain stands of coniferous trees in large expanses of stage 3 and 4 of plant succession. This is particularly important in the foothills zone.

Cover: Nest on ground, often under shrubs or next to fallen logs. Like to nest near forest edges. In areas used heavily for livestock grazing, nest trampling can occur.

- Manage livestock to avoid grazing areas from mid-April through mid-June where blue grouse nest.
- Clear-cut small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 5 and 6 forest.
- Brush chop, chain, roller beat or control (prescribe) burn small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 4 vegetation to maintain stage 3 and 4 vegetation.

Water: Obtain necessary water from dew and diet. Although they are often found near water, no management practices are recommended for providing water.

Brewer's Sparrow

General Habitat Preference:

Associated with shrubs (stage 4 of plant succession), sagebrush in particular, on flat to gently sloping terrain. Shrub dominated areas less than 1/2 acre in size are usually not used.

Habitat Requirements:

Food: Glean insects and spiders from the leaves and branches of shrubs. Also eat seeds of forbs and grasses. Food is usually in sufficient supply.

Cover: Prefer to nest in dense sagebrush 20 to 30 inches in height. Also use shrubs for hiding cover. The amount and height of shrubs are important requirements for suitable habitat. The best management practice is maintenance of sufficient (usually the more the better) shrub canopy cover and height.

- Livestock grazing can promote the growth of shrubs used by this species.

Water: Obtain necessary water from diet, but will use other water sources when available. No management practices are recommended for supplying water.

Brown Thrasher

General Habitat Preference:

Stages 3 and 4 of plant succession. Dense, woody vegetation associated with shrub thickets, hedgerows, shelterbelts, forest edges, riparian areas, and young forests.

Habitat Requirements:

Food: Invertebrates and plant seeds are the principal foods. Forage primarily on the ground. Occasionally feed on fruits and berries in shrubs and trees. There is more food available when there is more ground litter. The management practices listed under cover will usually supply sufficient food.

Cover: Nesting and hiding cover are supplied by dense shrubs with some trees. Will use areas that have shrubs only. Need a minimum of 2.5 acres of woody vegetation to support a breeding population.

- Selective-cut forests in large expanses of stage 5 or 6 woodland.
- Clear-cut timber harvest can improve habitat once succession proceeds to stage 4 after harvest.
- Plant shrubs and trees (shelterbelts, hedgerows, field borders, clumps).
- Chaining, roller beating and controlled (prescribed) burning can be used to rejuvenate and improve habitat in large areas of old decadent stage 4 vegetation.
- Manage livestock grazing in riparian areas and other woody areas so shrubs and trees can regenerate and ground litter is present. Grazing in the winter usually does less damage to woody vegetation than at other times of year.

Water: Requirements unknown.

California Thrasher

General Habitat Preference:

Stage 4 of plant succession.

Habitat Requirements:

Food: Fruit, seeds, and insects. Forage primarily on the ground. In old decadent stands of shrubs, resprouting caused by disturbances such as fire, roller beating, chaining, or brush chopping can improve the habitat 2 to 3 years after the disturbance. The young shrubs will produce more fruits and seeds.

- Control (prescribe) burn, brush chop, chain, or roller chop small areas (40 acres maximum, 10 to 20 acres preferred) within large expanses of old decadent stage 4 vegetation.

Cover: Use thick shrub cover for hiding and nesting. Nests are placed in a shrub or small tree usually 4 or 5 feet above the ground. Nest is constructed of twigs. The same management practices as discussed under food can improve cover.

Water: Obtain necessary water from diet, but will use other water sources when available. No practices are recommended for providing water.

California Quail

General Habitat Preference:

Open areas (stages 2 and 3 of plant succession) interspersed with shrubby areas (stage 4 of plant succession). Use riparian areas.

Habitat Requirements:

Food: Seeds and green leaves of forbs, fruits, nuts, and grain. Need cover close to food.

- Periodic controlled (prescribed) burning of small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 4 and 5 vegetation.
- Brush chop, chain, or roller beat small areas in large expanses of stage 4 and 5 vegetation.
- Disk small areas in large expanses of stage 3 and young stage 4 vegetation.
- Livestock grazing management should leave adequate herbaceous vegetation needed to supply food.
- Plant annual and perennial forbs in open areas with no forb production.
- Leave grain in croplands adjacent to shrubby areas by leaving areas unharvested and/or minimizing fall tillage of grain stubble.

Cover: Nest on ground under shrubs. Need forbs and grass under shrubs. Roost in trees or tall (6 feet minimum) shrubs at night. Hide in shrubs near food and water.

- Plant shrubs and trees in large expanses of stage 2 and 3 vegetation.
- Construct brush piles in areas where cover is not adequate.
- Livestock grazing management as under Food.
- Construct roosting platforms in areas where trees and tall shrubs are missing.

Water: Require water, especially in the summer. Usually will not travel over 1/2 mile for water. Need cover very close to water.

- A variety of water developments can be constructed.
  Guzzlers
  Catchment ponds
  Spring developments
- Exclude livestock from portions of the watering area so that cover can grow near water.
- Plant shrubs near water sources.
- Construct brush piles near water sources.

Canada Goose (Breeding Habitat)

General Habitat Preference:

Nest and rear young in or near stage 2 wetlands interspersed with some stage 3 wetlands. Wetlands containing 20 percent tall emergent aquatic vegetation and 80 percent open water are usually good habitat. Also frequent riparian areas adjacent to rivers.

Habitat Requirements:

Food: During the nesting season and summer prefer new green forbs and grasses. Also eat some aquatic insects and pond weeds.

- Livestock grazing management or burning can be used to produce the preferred lush green vegetation.
- Burn or brush chop small areas (40 acres maximum, 10 to 20 acres preferred) every 3 to 5 years.

Cover: Nest in a variety of places such as mats of bulrushes, tops of muskrat houses, in trees, and most of all, on islands. Use artificial nest structures. Usually nest within 200 feet of water's edge.

- Construct ponds and wetlands.
- When possible, use water control structures for managing water levels to maintain approximately 80 percent open water and 20 percent emergent vegetation.
- Build islands and/or peninsulas surrounded by open water.
- Provide artificial nest structures.

Water: Require water as described above.

Common Nighthawk
Lesser Nighthawk

General Habitat Preference:

Stage 1, bare ground for nesting. Stages 2 and 3 of plant succession interspersed with areas in stages 4 and 5 of plant succession. Areas such as grasslands, open woodlands, cities and towns. In cities and towns they are often seen flying over city parks and other open areas in late evening and early morning.

Habitat Requirements:

Food: Eat flying insects captured on the wing. Flying ants, mosquitos, moths, and June bugs are examples.

- Use insecticides only when necessary. Carefully follow the directions on the label.

Cover: They do not build nests, but lay their eggs on the ground, often gravelly or sandy, and on flat roofs of buildings. Riparian areas, ridge tops, and other places with numerous sand and gravel areas are favorite nesting locations.

- Do not disturb nests during nesting season (May through June). Stay off roof tops that are used for nesting.

Water: Do not drink water often. Obtain ample water from their diet.

Crissal Thrasher

General Habitat Preference:

In desert, prefer riparian areas and areas with thick shrubby vegetation, often near water.

Habitat Requirements:

Food: Fruits, berries, and seeds are a large part of the diet. Also eat insects and lizards. Like most thrashers they forage primarily on the ground.

- Management of livestock is needed to insure adequate lower herbaceous and shrub layers are present to provide food and cover. This is particularly important in riparian areas and bands of thick shrub vegetation found adjacent to drainage ways (arroyos). Usually grazing when the vegetation is not growing fast does less damage to woody vegetation than grazing during other times of year. This may require the development of livestock water facilities in upland areas to discourage congregation and overuse in riparian areas.

Cover: Use thick shrub cover for hiding and nesting. Nests are placed in shrubs from 2 to 8 feet above the ground, and are constructed of twigs.

- Trees and shrubs can be planted in agriculture and riparian areas. In dry regions irrigation may be necessary.
- Management of livestock grazing as explained under food can also maintain and improve cover.

Water: Require water daily.

- A variety of water developments can be constructed.

Catchment ponds
Windmills
Spring developments
Guzzlers

Eastern Bluebird
Western Bluebird

General Habitat Preference:

Stages 2 and 3 of plant succession interspersed with stages 5 and 6 vegetation.

Habitat Requirements:

Food: Insects and spiders make up a large portion of the diet. A limited amount of fruit is also eaten. Bluebirds usually forage in open areas.

- Clear-cut small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 5 and 6 woodland.
- Brush chop, chain, or roller beat, small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 4 vegetation.
- In areas dominated by mesquite, root plowing combined with the seeding of grasses and legumes may be the best way to maintain areas in stage 3 vegetation.
- Control burn small areas in large expanses of stage 4 and 5 vegetation.

Cover: Nesting sites are in natural cavities and old woodpecker holes.

Leave 3 to 4 standing dead or nearly dead large trees per acre during timber harvest operations.

- Place nest boxes 4 to 5 feet high in or adjacent to open areas. Boxes should be spaced more than 200 feet apart.

Water: Obtain necessary water from diet, but will use other water sources when available.

European Starling

General Habitat Preference:

Prefer older urban residential areas with large trees and shrubs. Most urban areas that have large trees or old buildings with holes and cavities are used.

Starlings were introduced to the United States from Europe and are considered pests as they are numerous and often out-compete native birds for available habitat. In such situations the management objectives may be to reduce the quality and quantity of available habitat. However, in the inner cities where there are few wildlife species, management may include providing for the only wildlife that exists.

Habitat Requirements:

Food: Insects, fruit, seeds, human garbage, even dog and cat food.

Usually do not use artificial feeders. However, starlings can be attracted to an area by spreading bread crumbs and small grains on the ground in yards, etc.

Cover: Nest in cavities in trees, old buildings, and old houses. Will use artificial nest boxes.

- Provide nest boxes where adequate nest sites are lacking.
- Plant and maintain deciduous trees.

Water: Require water during warm seasons.

- Birdbaths, pans of water, or puddles of water can attract starlings.

Gambel's Quail

General Habitat Preference:

Stages 2 and 3 of plant succession interspersed with stage 4. In areas where plant succession is not obvious, dense shrubs and cacti intermingled with small open areas are used.

Habitat Requirements:

Food: Succulent green plants, especially legumes. The amount of late winter and early spring precipitation determines the quality and quantity of spring food. In essence, more rain equals more quail. Over much of the region there are few management practices considered practical for improving food other than proper livestock grazing management.

- Manage livestock grazing to leave some forbs and grasses available for food. Winter and spring grazing have the highest impacts on quail habitat. Grazing management is very important in riparian areas. This may include the development of livestock watering facilities in upland areas to discourage the congregation and overuse of riparian areas.

Cover: Nest in the thickest shrub and/or herbaceous vegetation available. Roost in tall shrubs and trees. Rest under shrubs during the day.

- Brush piles can be constructed in areas where shrub cover is scarce.
- Plant shrubs on idle land and riparian areas if additional cover is needed. In dry regions, irrigation of plantings may be necessary.

Water: Require water during warm seasons if succulent green plants are not available for food. Usually will not travel over 1/3 mile for water.

- Where water is limited or absent, development of water sources is desirable.

Guzzlers
Catchment ponds
Windmills
Spring developments

Grasshopper Sparrow

General Habitat Preference:

Associated with grasslands (stage 3 of plant succession), do not often use areas when shrub canopy exceeds 25 to 35 percent.

Habitat Requirements:

Food: Eat insects of all types. As you might have guessed, grasshoppers are a favorite. In winter eat forb (weed) seeds.

Use insecticides only when necessary. Carefully follow the directions on the label.

Cover: Prefer to nest in dense grass with abundant litter (residual vegetation from previous years growth).

- Proper livestock management would include leaving some residual vegetation for nesting habitat and only grazing areas light to moderately during nesting season.
- Plant grasses in large areas with little grassland.
- Controlled (prescribed) burning and brush chopping can be used as alternatives to grazing for rejuvenating old less productive grasslands and pastures.
- Chaining can be used to revert succession to stage 3.
- Delay harvest and mowing of grass in areas such as roadsides, ditches, and grass hay fields until mid-summer.

Water: Obtain necessary water from diet.

Gray Partridge

General Habitat Preference:

Stages 3 and 4 of plant succession interspersed with cropland that grain crops are grown on. Gray partridge will not usually travel more than 1/2 mile, so food and cover need to be close together.

Habitat Requirements:

Food: Grain such as wheat, barley, oats, and corn; also some forb (weed) and grass seeds. Generally, farming methods used supply adequate waste grain in regions where gray partridge live.

Cover: Nest in native grasslands and in hayfields. Use shrubs found in hedgerows and windbreaks, and tall grass for shelter.

- Plant shrub hedgerows and windbreaks in areas where cover is missing.
- Plant grasses in areas where nesting cover is lacking.
- Chaining can be used to revert succession to stage 3.
- Delay mowing of grass areas such as roadsides, ditches, and grass hay fields until midsummer.
- Manage livestock grazing to provide tall grass cover in portions of the grasslands.

Water: Obtain necessary water from diet, dew, and snow.

Greater Prairie Chicken

General Habitat Preference:

Unbroken blocks (160 acres minimum) of vegetation in stage 3 of plant succession that is relatively free of shrubs. Flat to gently rolling terrain with some mixing of cropland. Croplands are not necessary, but can furnish important foods, especially in the northern part of the United States.

Habitat Requirements:

Food: Prairie chickens primarily eat seeds, grains, and herbaceous greens. During the first few weeks after hatching the young eat insects.

All necessary food can be found in grasslands. Management of grasslands as explained under Cover will supply ample food.

- Eliminate fall tillage of grain stubble on croplands adjacent to areas in stage 3 of plant succession.
- Unharvested grain and small annual food plots can attract prairie chickens. If adequate grasslands are present, these practices are not necessary for survival.

Cover: Thick, tall grass cover is used for nesting and winter cover. If not periodically disturbed, grasses often become too thick and are less valuable for nesting cover.

- Livestock grazing should be managed to provide nesting and winter cover. Grass should be a minimum of 6 inches tall in the fall when grazing is finished. Some areas of grass should be left ungrazed during the nesting season (May through June).
- Controlled (prescribed) burning every 3 to 5 years, and brush chopping can be used to improve plant vigor and reduce excessive buildup of old vegetation in areas that are not grazed.
- Chaining can be used to revert succession to stage 3.
- Plant large fields of grasses and legumes. When possible, use grass species that are native to the area.

Water: Do not need water on a regular basis. Obtain necessary water from their diet.

Special: Require sites with short vegetation that offer good visibility for breeding displays. Prairie chickens gather on these sites in the spring where males display in front of females to win a mate. These areas are called "booming grounds."

Hairy Woodpecker

General Habitat Preference:

Stages 4, 5, and 6 of plant succession are best habitat. Will use stage 3 of plant succession if areas with mature trees are nearby. Also use wooded urban and riparian areas.

Habitat Requirements:

Food: Majority of food is animal matter such as ants, beetle larvae, caterpillars, and adult beetles. The diet is supplemented with fruits and nuts. They forage on a variety of places such as tree trunks, stumps, snags, downed logs, and the ground. Where adequate cover exists, food is usually not limiting.

Cover: Holes are excavated in mature and dying trees and snags for nesting.

Maintain areas with large mature and dying trees, especially in open areas. Within wooded areas maintain at least 1 large snag per acre.

- Plant softwood trees.
- Manage livestock grazing in riparian areas to maintain trees. Grazing when woody vegetation is not growing fast (fall and winter) usually does less damage to woody vegetation than at other times of year.

Water: Not limiting, probably obtain necessary water from diet.

House Finch

General Habitat Preference:

Found in a wide variety of urban areas that have trees, shrubs, and some open areas. Not as abundant in inner cities.

Habitat Requirements:

Food: Soft fruits, buds, and weed seeds. In the warm season eat some insects.

- Use artificial feeders of all types. Millet and sunflower seeds are favorites.

Cover: Nesting sites on low branches of trees, on branches of bushes, in natural cavities, in old holes excavated by woodpeckers, and any projection or ledge it can find on houses and buildings. Prefer to place nest from 5 to 7 feet above the ground. Nest is built of weed stems, small branches and leaves.

- Plant shrubs adjacent to open areas for nesting and hiding cover.
- Do not disturb nests found on houses and buildings unless they are causing a problem such as plugging a rain gutter.

Water: Require water daily in warm seasons.

n Birdbaths and pans of water can be provided, or a low area in the yard can be filled with water. Try not to place water in areas where cats and other pets can catch the birds.

House Sparrow

General Habitat Preference:

This introduced species is found in a wide variety of urban categories that have buildings, trees, shrubs and some open areas.

Compete with native house finches and other birds for habitat requirements. Can become a nuisance, and management objectives may be to reduce the quality and quantity of available habitat.

Habitat Requirements:

Food: Eat a variety of insects, fruits, buds, and weed seeds.

- Will use artificial feeders of all types. Millet and sunflower seeds are favorites.

Cover: Nest on low branches of trees, on bushes, in natural cavities, in old holes excavated by woodpeckers, and on any projection or ledge it can find on buildings or other structures. Prefer to place nest from 5 to 7 feet above the ground. Nest is built of weed stems, small branches, and leaves.

- Plant shrubs adjacent to open areas for nesting and hiding cover.
- Do not disturb nests found on houses and buildings unless they are causing a problem such as plugging a rain gutter.

Water: Require water daily in warm seasons.

- Birdbaths and pans of water can be provided, or a low area in the yard can be filled with water. Try not to place water in areas where cats and other pets can catch the birds.

House Wren

General Habitat Preference:

In urban setting, prefer older residential areas with large shrubs and trees.

Habitat Requirements:

Food: Spiders, grasshoppers, crickets, beetles, caterpillars, ants, bees, ticks, and millipedes. Artificial feeders are usually not used.

- Plant and maintain shrubs and trees.
- Use insecticides only when necessary. Carefully follow instructions on the label.

Cover: Nest in natural cavities in trees, old buildings and other structures. Will use artificial nest boxes.

- Plant and maintain shrubs and trees.
- Provide nest boxes where adequate nesting sites are lacking. Boxes should be placed high on a tree trunk or under the eaves of a house. The hole should be small to keep out house sparrows, starlings, and other birds.
- Do not disturb nests found on houses and buildings unless they are causing a problem.

For specifics on nest box design and placement, visit the local Cooperative Extension office.

Water: Obtain necessary water from diet. Do not need to drink water.

Hummingbird

General Habitat Preference:

Found in or near mixed woodlands and forests rich in flowering plants. Prefer stages 5 and 6 of plant succession mixed with areas in stages 2, 3, and 4. In urban setting, prefer areas with large trees and nearby flowering plants.

Habitat Requirements:

Food: Nectar from flowers and insects found on flowers. Hummingbirds require high energy foods. Nectar is high in sugars that supply the needed energy. Insects are an important source of protein.

- Plant flowers. Hummingbirds seem to be attracted to the color red. Some preferred flowers are petunias, gladiolus, nasturtiums, begonias, morning glory, evening primrose, columbine, and cardinal flower.
- Plant flowering shrubs and trees. Favorites are honeysuckle, mesquite, lilac, flowering dogwood, and various fruit trees.

They use artificial feeders filled with honey-water dyed red (1 part honey to 4 parts boiled water). Use honey rather than sugar whenever possible as it is better food for hummingbirds. Keep feeders clean.

- Use insecticides only when necessary. Carefully follow instructions on the label.

Cover: Construct small nests on tree branches, usually 5 to 20 feet above the ground. Occasionally build nests in secluded areas on houses and buildings. Nest is made out of leafy materials and spider silk.

- Plant and maintain trees. Trees with rough bark are preferred.
- Do not disturb nests found on houses and buildings unless they are causing a problem such as plugging a rain gutter.

For specifics on artificial feeder design and placement visit the local Cooperative Extension office.

Water: Obtain necessary water from diet. Do not need to drink water.

Ladder-backed Woodpecker

General Habitat Preference:

Stages 4, 5, and 6 of plant succession in riparian and other areas with trees. In Hot Desert and Prairie Brushland Regions they use areas with large mesquite, screw bean, and palo verde trees. These woodpeckers also use agave and yucca cactus.

Habitat Requirements:

Food: Eat mostly insects. Glean beetle larvae from trunks and branches of trees. Often eat ants, caterpillars, and cotton worms found on small trees, shrubs, and various cacti. Food is usually in sufficient supply when the proper vegetation is present.

Cover: Nest in holes excavated in trees, shrubs, and the stalks of agave and yucca cactus.

- Livestock grazing should be managed to maintain vigor of existing trees and willows. Usually grazing in the fall and winter when the vegetation is not growing rapidly does less damage to woody vegetation than at other times of year. This is particularly important in riparian areas. Management of livestock grazing in the dry regions where this woodpecker is found often includes the development of livestock watering facilities in upland areas to discourage the congregation and overuse of riparian areas.
- Plant trees in riparian areas and other moist sites.

Water: Obtain necessary water from diet.

Mallard (Breeding Habitat)

General Habitat Preference:

Nest in tall forb and grass vegetation, or in shrubby cover. Need open water (stage 2 of wetland succession) with associated emergent aquatic vegetation (stage 3) to raise young.

Habitat Requirements:

Food: Aquatic plants and insects are common foods. Ducklings eat mostly aquatic insects. Most food is associated with wetlands.

- In areas without wetlands, build ponds and reservoirs with gently sloping banks or re-establish old wetlands.
- Construct small dikes to provide temporary open water areas mixed with aquatic emergent vegetation through the breeding season.
- Provide some shallow water areas (less than 2 feet deep) adjacent to deep water where emergent and submergent vegetation can grow.
- Unharvested grain and grain stubble that has not been tilled can provide high energy food needed by nesting hens.

Cover: Nest in grass and forb vegetation (sometimes nest under shrubs) preferably within 1/2 mile of a wetland that provides open water with some adjacent emergent aquatic vegetation. After ducklings hatch they use open water and adjacent emergent aquatic vegetation for protection from predators. Ideally, wetlands will have a minimum of 50 percent open water and 10 percent to 20 percent emergent vegetation.

- Cover can be created with practices described under Food.
- Water developments constructed for wildlife and livestock drinking such as dugouts and catchment ponds are often used to raise broods.
- Control water levels to create some deep water areas (more than 2 feet deep) where emergent vegetation won't grow, and manage the vegetation in wetlands (stage 2). Water control structures are useful for this purpose.
- Control (prescribe) burn, brush chop, or use livestock grazing to rejuvenate dense, stagnant vegetation in nesting areas. Burn or chop every 3 to 5 years in spring before nesting begins. These practices can be used to increase or maintain proper water and vegetation interspersion in wetlands.
- Plant grass and forb (legumes) vegetation within 1/2 mile of wetlands that meet the above criteria.
- Livestock grazing should be managed to provide areas with tall, healthy, herbaceous vegetation that are not disturbed during the nesting season.
- Delay mowing. Harvest hay and crops adjacent to wetlands after nesting season.

Water: Require and use water as previously described.

Mallard (Winter Habitat)

General Habitat Preference:

Wetlands with open water, harvested grain crops, and riparian areas with open water.

Habitat Requirements:

Food: Preferred foods include waste grain from agriculture, aquatic plants, and invertebrates. Mallards will fly long distances to feed. However, the closer the food is to cover the more valuable it is.

- Provide waste grain in winter by not tilling grain fields in the fall.
- Leave some grain unharvested.
- Use small dikes to flood grain fields, planted food plots, and oak woodlands in winter.
- Build ponds and reservoirs with some shallow water (less than 2 feet deep) where aquatic vegetation can grow.

Cover: Rest on open water bodies such as streams, rivers, and warm-water sloughs that are not frequently disturbed. Also rest on the ice in the middle of lakes.

- Build ponds, reservoirs, and warm-water sloughs.
- Water developments constructed for livestock drinking such as dugouts and catchment ponds are also used for resting.

Keep human disturbance to a minimum.

Water: Use water as described above.

Mourning Dove

General Habitat Preference:

Stages 2 and 3 of plant succession with some shrubs and trees nearby. Often use agriculture areas for feeding.

Habitat Requirements:

Food: Waste grain from cropland and a variety of grass and forb seeds.

- Do not till in fall after harvest of small grain crops. Leave waste grain available.
- Leave some areas of small grains (wheat, barley, millet, milo, or oats) unharvested.
- Plant annual food plots in areas lacking grain.
- Brush chop, chain, or roller beat small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 4 vegetation.
- Clear-cut small areas (40 acres maximum, 10 to 20 acres preferred) in large areas of stage 5 and 6 woodland.
- Control burn small areas (40 acres maximum, 10 to 20 acres preferred) in large areas of stage 4 and 5 of plant succession.
- Livestock grazing can be used to keep some areas in stage 2 and 3 vegetation.

Cover: Prefer tall shrubs and trees for nesting and loafing. Nest is made of twigs placed on branches of shrub or tree. Nests are also placed on ground.

- Plant shrubs and trees in large areas of stage 2 and 3 of plant succession, or in agricultural areas having few trees or shrubs. Plant on field borders, along fence rows, or any other idle land area.
- Mourning doves often construct loose, flimsy nests. High winds and rainstorms often destroy many of them. To provide secure nesting sites, wire cone nesting structures can be placed where tree limbs fork 6 to 15 feet above the ground. This practice is most useful in regions were high winds and large open areas are common.

Water: Require water daily. Prefer shorelines and banks without vegetation.

- Where water is limited or absent, development of water sources is desirable.

Catchment ponds
Guzzlers
Windmills
Spring developments

Northern Bobwhite

General Habitat Preference:

Stages 2, 3, and 4 of plant succession interspersed. Ideally, habitat components are made up of 1/4 grassland, 1/2 cropland, 1/8 shrub cover, and 1/8 woodland.

Habitat Requirements:

Food: Young quail eat insects. Adult quail eat a variety of seeds, green vegetation (mostly forbs), insects and small grain.

- Plant 1/8 to 1/4 acre annual food plots in areas with too little cropland. One plot per 15 acres maximum.
- Leave some grain unharvested.
- Plant 1/8 to 1/4 acre perennial food plots in areas with too little permanent food and cover. Again, 1 plot per 15 acres maximum.
- Clear-cut small areas (small 10 acre patches or strips) in large expanses of stage 5 and 6 woodland.
- Selective-cut stage 6 woodlands.
- Brush chop, chain, root plow, or roller beat small areas (10 acres or less) in large expanses of stage 4 vegetation.
- Control (prescribe) burn small areas (10 acres or less) in large expanses of stage 3 and 4 vegetation. Annual burning in stage 5 and 6 woodlands is also beneficial.
- Disk small areas in large expanses of stage 3 and 4 to encourage annual forbs and grasses used by bobwhite.
- Livestock grazing should avoid using planted food plots. Ample amounts of herbaceous vegetation used for food by quail should be left in appropriate areas. This is especially important in riparian areas. Livestock grazing also can be used to revert or maintain vegetative succession in stages 2 and 3 vegetation.

Cover: Thick shrubs for hiding and roosting cover.

- Plant shrubs in areas where cover is scarce.
- Construct brush piles.
- Manage livestock grazing to maintain dense shrub and herbaceous cover. Again this is important in riparian areas.

Water: Require water regularly in warm seasons.

- In the Woodland and portions of the Prairie Brushland Regions where available water is limited or absent, development of water sources is desirable.

Ponds
Dugouts
Guzzlers
Windmills
Spring developments

Northern Flicker

General Habitat Preference:

Open areas in stages 2 and 3 of plant succession interspersed with areas of stages 5 and 6 of plant succession. Often found in riparian and urban areas. Prefer older urban residential areas with large trees, golf courses, and parks.

Habitat Requirements:

Food: Ants are a favorite and over 50 percent of the diet is insects. Also eat seeds, fruits, and berries. Partial to the fruit of poison oak and poison ivy. Usually feed in open areas.

- Clear-cut small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 5 and 6 forests.
- Selective-cut timber management in stages 5 and 6 of plant succession.
- Artificial feeders are used in urban areas. Prefer suet feeders fastened to tree trunks.

Cover: Holes are excavated in trees for nesting. Use softwood trees like poplar, cottonwood and willow. Prefer old mature trees that show signs of dying or rotting. In treeless areas will nest in posts, holes in banks, and holes in houses and structures.

Maintain some large mature and standing dead trees when harvesting timber (not applicable with clear-cuts as wind will probably blow single trees down).

- In large expanses without trees, plant softwood trees.

Water: Not much is known about daily water requirements. Probably obtain sufficient water from diet.

Special: European starlings often take over flicker holes for their own nests.

Northern Goshawk

General Habitat Preference:

Stages 5 and 6 of plant succession.

Habitat Requirements:

Food: A variety of mammals and birds such as varying hare, blue grouse, red squirrel, and various small birds.

Cover: Nest in stands of mature trees. Usually place nest 20 to 80 feet above the ground on a large horizontal limb of a mature tree. Often use the same nest site for up to 5 consecutive years.

Maintain at least 30 acres of forests around all known nest sites.

- Limit timber harvesting to selective systems and only during non-nesting seasons.

Water: Obtain necessary water from diet.

Nuttall's Woodpecker

General Habitat Preference:

Stages 4, 5, and 6 of plant succession. Found in riparian areas and areas with live oak trees and large oak and ceanothus shrubs.

Habitat Requirements:

Food: Mostly insects. Glean beetle larvae, ants, caterpillars, and other invertebrates from trunks and branches of trees and shrubs. Food is usually in sufficient supply.

Cover: Nest in holes excavated in trees and large shrubs.

- Livestock grazing should be managed (especially in riparian areas) to maintain vigor of existing trees. Usually grazing in riparian areas during winter and fall does less damage to trees because vegetation is not growing. This may require the development of livestock watering facilities in upland areas to discourage congregation and overuse in riparian areas.
- Plant trees in riparian areas and other moist areas.

Water: Obtain necessary water from diet, but will use other water sources when available.

Ovenbird

General Habitat Preference:

Associated with stages 5 and 6 of plant succession. Lives on or very near the ground.

Habitat Requirements:

Food: Mainly insects (ants, caterpillars, and beetles) slugs, snails, and earthworms. Seeds and fruits are also occasionally eaten.

- Selective-cut forest management in large expanses of stage 6 woodland can increase the amount of insects.

Cover: Nest on the ground. Construct a unique nest out of grasses and weed stems that is arched over in the shape of a Dutch oven. Nest is usually well hidden in herbaceous vegetation on the forest floor. The herbaceous vegetation is also used for hiding cover.

- Livestock grazing should be managed so that adequate herbaceous vegetation is maintained on the forest floor.
- Selective-cut forest management in large expanses of stage 6 woodland could increase cover used by this species.
- Plant trees and shrubs in large areas of stages 3 and 4 of plant succession.

Water: Usually obtain necessary water from diet, but will use other water sources when available.

Redhead

General Habitat Preference:

Stage 2 wetlands for most activities. Usually nest in emergent aquatic vegetation associated with stage 3 wetlands that are adjacent to stage 2 wetlands.

Habitat Requirements:

Food: Eat primarily aquatic invertebrates (mollusks, snails, crustaceans) during late spring and early summer, especially young ducks. During rest of year prefer aquatic plants such as pond weeds, muskgrass, bulrush seeds, wild celery, water lily seeds, and coontail.

- Control water level with water control structures to promote growth of tall emergent aquatic vegetation (stage 3 wetland) adjacent to stage 2 wetlands with an abundance of floating and submerged aquatic vegetation (water depth 3 to 5 feet).
- Build ponds/wetlands with a minimum size of 1 surface acre of water, and manage water levels to provide habitat similar to that described above.
- Construct small dikes to temporarily flood areas dominated by tall emergent aquatic vegetation during the nesting season.

Cover: Build nests out of emergent aquatic vegetation. Nests are usually placed above water or very near shore in dense vegetation that provides concealment.

- Control water levels to promote growth of tall emergent aquatic vegetation. Strive for wetlands comprised of 50 percent stage 3 interspersed with 50 percent stage 2 wetland.
- Manage livestock grazing to maintain tall emergent aquatic vegetation adjacent to the water. Prolonged protection of nesting areas from disturbances such as grazing and fire can result in deterioration of the vegetation. Intense grazing of such areas every 3 to 5 years (after nesting season) often rejuvenates the vegetation. Usually only 1/3 to 1/2 of the nesting area should be treated during any one year.
- Controlled (prescribed) burning every 3 to 5 years and brush chopping can be used to rejuvenate deteriorated vegetation (see livestock grazing).

Water: Require water as described above.

Red-tailed Hawk

General Habitat Preference:

Open areas (stages 2 and 3 of plant succession) interspersed with trees (stages 4, 5, and 6, of plant succession). Single trees in open areas are often utilized.

Habitat Requirements:

Food: Small mammals such as ground squirrels, rabbits, and mice are the major food items. Some birds and reptiles are also eaten.

- Manage livestock grazing to maintain some areas with an adequate herbaceous ground layer for small mammals to live in.
- Control (prescribe) burn, brush chop, chain, or roller beat small areas (40 acres maximum) in large expanses of stage 4 vegetation. Burning and brush chopping can also be used to rejuvenate stage 3 vegetation and improve small mammal habitat.
- Clear-cut small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 4, 5, and 6 woodlands.
- Provide perch poles or plant trees in areas where trees are absent.

Cover: Nests are usually built 30 to 90 feet above the ground in the crotch or fork of a tree. Will nest less frequently in cliffs.

- Plant trees where trees are not present (irrigate if necessary).

Maintain large mature trees in areas where trees are not plentiful.

- Provide nesting platforms.

Water: Obtain necessary water from diet.

Red-winged Blackbird (Breeding Habitat)

General Habitat Preference:

Stage 3 wetlands dominated with emergent aquatic vegetation.

This species can be a pest in agricultural areas where they may damage crops. In such situations management objectives may be to reduce the quality and quantity of habitat. It is often more appropriate to manage for this species in urban wetlands and other areas where crop damage is not common.

Habitat Requirements:

Food: Use waste grain and seeds of annual forbs in fall, winter and early spring. Eat a variety of insects in the summer. Many of the insects used for food are associated with tall emergent aquatic vegetation such as cattails, bulrushes, marsh grass, and a variety of shrubs and trees.

- Control water levels with water control structures and small dikes to provide shallow water where emergent vegetation can grow.
- Construct ponds and wetlands with shallow water (less than 2 feet deep) where tall emergent aquatic vegetation can grow.
- Livestock grazing adjacent to and/or in wetlands should be managed to maintain cattails, shrubs, and trees.
- Controlled (prescribed) burning and brush chopping every 3 to 5 years can be used to rejuvenate old, decadent emergent aquatic vegetation.

Cover: Nest close to the ground or water in dense clumps of emergent aquatic or other herbaceous vegetation. Often roost (rest) in the same areas or in nearby trees and shrubs.

- The practices listed under food could also be used to manage cover.
- Plant trees and shrubs adjacent to wetlands and ponds (not on the dike or dam).

Water: Frequent areas associated with water.

Ring-necked Pheasant

General Habitat Preference:

Stage 2 and 3 of plant succession interspersed with croplands used for growing grain crops.

Habitat Requirements:

Food: Waste grain is a preferred food when available. Weed seeds, green forbs and insects are also used, especially during late spring and early summer.

- Need grain for food. Do not fall till.
- Leave strips of unharvested grain adjacent to cover areas.

Maintain areas of stage 2 vegetation for food in the spring. Don't burn, mow, or spray weeds along ditches, roadsides, and other idle land areas until after nesting season.

- Plant annual food plots in areas where grain crops are scarce.

Cover: Use herbaceous cover for nesting (tall grass and forbs are preferred). Hay fields are attractive for nesting, but harvesting often destroys nests. Also nest in small grain stubble (wheat, barley, and oats) left standing from crops of previous year.

Use tall dense herbaceous cover that is not filled with wind blown snow for resting and winter survival. Tall emergent aquatic vegetation associated with wetlands is often used for cover in winter. To be valuable for winter survival and nesting cover, areas of herbaceous cover should be at least one acre in size and at least 25 to 30 feet wide. Although not necessary for survival, pheasants use shrubs, trees, and other woody vegetation for hiding and loafing. In general, all cover vegetation should be in close proximity (1/2 mile or less) to grain fields.

- For winter and nesting cover, plant or maintain areas of tall grasses and forbs (irrigate if necessary) adjacent to grain fields so such areas will not be disturbed by harvesting or other human activities.
- For winter cover, plant trees and shrubs on idle land adjacent to grain fields (irrigate if necessary).
- Control (prescribe) burn, brush chop, or use livestock grazing to rejuvenate dense stagnant vegetation in nesting areas. Burn or chop every 3 to 5 years in late winter before nesting begins.
- Do not till standing small grain stubble and delay harvest of hay until after nesting season, if possible.
- Manage livestock grazing. Do not graze cover areas during nesting season. Allow vegetation to re-grow after grazing so cover will be available the following winter and nesting season.
- Construct ponds and/or wetlands to provide tall emergent aquatic vegetation for winter cover.
- Control water levels and provide shallow water to encourage the growth of tall emergent aquatic vegetation.

Water: Use in warm seasons when available. Usually is not a limiting factor.

Rock Dove (Pigeon)

General Habitat Preference:

In urban areas prefer large buildings and nearby parks and open areas.

In some areas rock doves become so numerous that they are considered pests. In such situations the management objectives may be to reduce the quality and quantity of available habitat. However, in the inner cities where there are few wildlife species, management may include providing for the only wildlife that exists.

Habitat Requirements:

Food: Forage on the ground. Prefer waste grain and weed seeds. In urban areas live mostly on human handouts.

- Artificial feeding. Small grains, millet, and sunflower seeds can be spread on the ground preferably in parks and vacant lots, or on roof tops of buildings.

Cover: Nest on window ledges, roof tops, bridges, and a variety of structures.

Water: Require water frequently in warm seasons. Usually can fly far enough to find water.

Ruffed Grouse

General Habitat Preference:

Stages 4, 5, and 6 of plant succession. Optimum habitat includes all three stages interspersed in close proximity to each other.

Habitat Requirements:

Food: Primarily twigs, buds, and flowers of shrubs and trees. Buds of aspen or other deciduous trees are needed for winter survival. Young grouse eat insects.

- Clear-cut small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 6 woodland. The benefits of this management practice will not be seen until stage 4 and 5 vegetation becomes established on cut area.
- Controlled (prescribed) burns can be used to revert vegetative succession from stage 6 to stages 4 and 5.
- Selective-cut forest management in large expanses of stage 6 woodland.
- Livestock grazing should be managed so that young deciduous trees and shrubs are maintained in the area.

Cover: Winter cover is considered most critical. Grouse use shrubs, deciduous trees, and conifer trees for cover. In cold weather they use low branches of conifer trees. However, deciduous trees provide the best cover.

Cover can be improved with practices listed under Food.

Water: Obtain necessary water from diet.

Rufous-sided Towhee

General Habitat Preference:

Stage 4 of plant succession. Associated with a wide variety of shrubs.

Habitat Requirements:

Food: Forage on the ground, eating invertebrates such as ants, beetles, caterpillars, and grasshoppers. About half of the diet is made up of seeds and green foliage of forbs, grasses, and shrubs.

- Livestock grazing management should leave adequate herbaceous vegetation needed for food.

Cover: Use shrubs for hiding and protective cover. Nest on ground, usually under shrubs.

- Clear-cut small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 5 and 6 woodland.
- Controlled (prescribed) burning of small areas (40 acres maximum, 10 to 20 acres preferred) in old decadent stands of stage 4 vegetation will promote resprouting of shrubs.
- Chaining, roller beating or brush chopping small areas (40 acres maximum, 10 to 20 acres preferred) in old decadent stands of stage 4 vegetation will also promote resprouting of shrubs.
- Plant shrubs in large areas of stage 2 and 3 vegetation.

Water: Obtain necessary water from diet.

Sage Grouse

General Habitat Preference:

Three-fourths of range should be dominated by sagebrush (stage 4 of plant succession). One-quarter of range should be meadows and grasslands (stage 3 of plant succession).

Habitat requirements:

Food: Diet varies with season. In spring and summer prefer insects, green forbs. In late fall and winter eat sagebrush.

Maintain sagebrush in areas that grouse traditionally use in winter. Reducing the amount of sagebrush with treatments such as spraying with herbicides, controlled burning, and brush chopping is a common practice used by ranchers to increase the amount of forage available for livestock. For sage grouse and other wildlife species that are dependent on sagebrush, the location and extent of such treatments should be considered carefully.

Cover: Nest on the ground, often under sagebrush within 5 miles of lek. Use sagebrush adjacent to open meadows for hiding cover in the summer.

Maintain sagebrush in nesting areas and within 100 feet of open meadow edges.

- Livestock grazing can encourage the growth of sagebrush. However, intense spring grazing can destroy some nests by trampling.

Water: Require water daily especially during the summer. Will fly up to 5 miles for water, but habitat is better if water is within 1 mile.

- Where water is limited or absent, development of water is desirable.

Catchment ponds

Guzzlers

Spring developments

Windmills

Special: Use open areas surrounded by sagebrush for courtship displays. The same areas are used traditionally every spring and are called "leks." Factors such as wet soils, or lack of soil (gravelly), often maintain these open areas in plant succession similar to stage 2 or 3 for long periods of time. In general, it is recommended to protect lek sites and the sagebrush within 1/4 mile of them.

Sage Thrasher

General Habitat Preference:

Associated with shrubs (stage 4 of plant succession), sagebrush in particular.

Habitat requirements:

Food: Diet is mostly animal food. Spiders, crickets, caterpillars, beetles, ants, and grasshoppers are eaten. Some fruits of deciduous shrubs also are eaten. Food is usually in sufficient supply.

Cover: Use sagebrush for nesting and hiding cover. Nest is usually placed in sagebrush close to the ground. The nest is constructed of twigs and grass.

The best management practice for cover is the maintenance of sagebrush dominated areas.

- Livestock grazing often encourages the growth of desired sagebrush.

Water: Obtain necessary water from diet.

Sharp-tailed Grouse

General Habitat Preference:

Stages 2, 3, and 4 of plant succession interspersed. Habitat components made up of 2/3 grassland and 1/3 shrubs and small trees. Cropland is not required, but if present can supply important foods. A mix of grassland, hayland, cropland, and areas of shrubs and trees provides good habitat for sharp-tailed grouse.

Habitat Requirements:

Food: Young grouse eat insects and small seeds. Adults eat a variety of leaves, buds, seeds, and grains. Buds of shrubs and small trees are the most important food in the winter.

- Plant small groups of shrubs in natural draws and idle land areas. This will provide cover as well as important winter food.
- Control burn grasslands to increase rangeland plant vigor which will increase the availability of insects and seeds.
- Minimize fall tillage of grain crop stubble to provide valuable winter food.
- Annual food plots can be planted to provide winter food.

Cover: Grouse nest on the ground in grass or sparse shrub cover. They use thick shrubs and tall herbaceous vegetation for cover in the winter. Tall dense vegetation associated with wetlands is also used for winter cover.

- Livestock grazing should be managed to maintain grass vigor. Delay grazing and harvest on portions of grasslands to provide tall undisturbed cover during the critical nesting season (May through June).
- Plant large fields of grass and legumes in areas with too little grassland.
- Construct ponds and/or wetlands with tall emergent aquatic vegetation.
- Develop shallow water areas in existing ponds and wetlands to encourage the growth of tall emergents.
- In existing wetlands, control water levels with water control structures to encourage the growth of tall emergent aquatic vegetation.

Water: Do not need to drink water on a regular basis. Obtain necessary water from their diet.

Special: Require bare or grassy ridges and natural rises that offer good visibility for breeding displays. Grouse gather on these sites in the spring where males dance in front of the females to win a mate. These areas are called "dancing grounds."

Maintain areas of thick grass and shrub cover within 1/2 mile of dancing grounds.

Song Sparrow

General Habitat Preference:

Open areas with forbs and nearby shrubs.

Habitat Requirements:

Food: Weed seeds and insects of all kinds. Will use artificial feeders of all types.

- Provide artificial feeders. Millet and sunflower seeds are favorites.
- Use insecticides only when necessary. When using insecticides, carefully follow the directions on the label.

Cover: Thick shrubs for nesting and hiding. Nest is often placed on the ground under a shrub or in thick herbaceous cover, and made of grass, leaves and weeds.

- Avoid disturbing nests.
- Plant and maintain shrubs.

Water: Require frequent water in warm seasons.

- Birdbaths and pans of water can be provided. Remember, try to place water in areas where cats and other pets can't catch the birds.

Western Kingbird

General Habitat Preference:

Stage 2 and 3 of plant succession interspersed with trees and tall shrubs.

Habitat Requirements:

Food: Primarily insects such as bees, wasps, grasshoppers, crickets, beetles, and caterpillars. Usually food is plentiful, however, excessive use of insecticides can reduce food.

Cover: Nest in trees or large shrubs 15 to 30 feet above the ground.

- Plant trees in large areas void of trees. Cottonwood, elm, ash, willow, oak, and sycamore are examples of trees to plant (irrigate if necessary).
- Plant grass and legumes.
- Controlled (prescribed) burning, brush chopping, chaining, roller beating, and root plowing can be used to maintain and/or revert vegetation to stage 3 of succession.

Maintain trees in areas where they are not plentiful.

- Avoid excessive livestock grazing in small shrub and tree thickets (field windbreaks, shelterbelts, etc.)

Water: Obtain necessary water from diet.

White-winged Dove

General Habitat Preference:

Use agriculture and open areas for feeding. They use shrubs and trees for nesting and loafing. Citrus groves, riparian areas, and urban areas are also used.

Habitat Requirements:

Food: Waste grain from cropland and a variety of grass and forb seeds.

- Disking small areas in stage 3 vegetation can encourage the growth of forbs.
- Do not moldboard plow. Leave waste grain available after harvest.
- Leave some small areas of grain crops unharvested.
- Plant annual food plots in areas with little cropland.
- Brush chop, chain, root plow, or roller beat small areas (40 acres maximum, 10 to 20 acres preferred) in large areas dominated by shrubs. In areas dominated by mesquite, root plowing combined with grass and legume seeding is the most effective method to revert succession to stage 2 and 3 vegetation.
- Control burn small areas (40 acres maximum, 10 to 20 acres preferred) in large areas dominated by shrubs. This is not effective in areas dominated by mesquite.
- Manage livestock grazing to leave some grass and forbs available for food. Important in riparian areas. This may include the development of livestock watering facilities in upland areas to discourage congregation in and overuse of riparian areas.

Cover: Use tall shrubs and trees for nesting and resting. Nest is made of twigs placed on branches of shrub or tree and is often in shaded area.

- Manage livestock grazing to maintain shrubs and trees used for nesting in riparian areas. Grazing when woody vegetation is not growing fast (winter and fall) does less damage than at other times of year.
- Plant shrubs and trees (irrigate if necessary).

Water: Require water daily. Will travel 10 to 15 miles for water, but the closer it is, the better. Prefer shorelines and banks without vegetation.

- Where available water is limited or absent, development of water sources is desirable.

Guzzlers

Catchment ponds

Windmills

Spring developments

- Construct ponds.

Wild Turkey

General Habitat Preference:

One-half to 3/4 of range in stages 5 and 6 of plant succession interspersed with areas in stages 3 and 4 of plant succession.

Habitat Requirements:

Food: Forage mostly on the ground for herbaceous plant seeds, nuts, acorns, and insects. Will use waste grain from croplands if adjacent to woodlands.

- Brush chop or disk small areas to maintain some stage 3 or 4 vegetation.
- Control (prescribed) burn every 3 to 5 years in stage 4 and 5 vegetation in eastern and southern United States.
- Clear-cut small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 5 and 6 woodland.
- Selective-cut forests in large areas of stage 6 woodland.
- Plant several perennial food plots and small (1 to 10 acre) fields to grasses and legumes in large expanses of stages 4, 5, or 6 vegetation, and in any other areas where food is limited.
- Plant mast trees.
- Eliminate fall tillage of grain crops, especially adjacent to woodlands.
- Leave small areas of grain crops unharvested.
- Plant annual food plots near woodlands.
- Livestock grazing management should leave some forbs and grasses available for food. This is especially important in riparian areas and may include the development of livestock watering facilities on adjacent uplands to discourage congregation in and overuse of these areas.

Cover: Nest is shallow depression on ground lined with leaves and grass that is well concealed in thick shrubs or woodlands. Usually nest within 1/4 mile of available water. Roost in trees or tall shrubs at night.

- In some areas will use artificial roost structures.
- Maintain a significant component of vegetation in stages 5 and 6 of succession, especially near streams.
- Plant trees and shrubs where cover is sparse.
- Livestock grazing management should leave thick herbaceous cover for nesting. Spring grazing can be detrimental to nesting habitat, especially in riparian areas.

Water: Require water frequently. Usually will not travel over 1/4 to 1/2 mile for water.

- Where water is limited or absent, development of water sources is desirable.

Catchment ponds
Guzzlers
Spring developments
Windmills

Wood Duck

General Habitat Preference:

Stage 5 woodlands flooded with water, and open water adjacent to stage 5 and 6 woodlands. Or, stage 3 and 4 wetlands dominated by trees adjacent to stage 2 wetlands.

Habitat Requirements:

Food: Fruits and nuts of woody plants, some grain, seeds of water lily and other aquatic plants, and some insects. Insects are used by young wood ducks.

- During late fall and winter, temporarily flood stage 5 deciduous woodland with mast trees, such as oak, and grain crops. Natural flooding may occur, or small dikes and water control structures may be used.
- Leave small areas of cropland that are near wetlands and open water unharvested.
- Plant mast trees adjacent to wetlands or in areas that can be temporarily flooded.
- Selective cutting of woodlands that can be flooded is desirable to improve mast production.
- Construct ponds and/or wetlands and provide shallow water areas where aquatic emergent vegetation can grow.

Cover: Nest in cavities in trees of flooded woodlands or adjacent to water. Use stage 2 and 3 wetlands with an abundance of aquatic vegetation to raise young.

- Nest boxes can be provided if adequate nest sites are limited.
- Plant trees for future nesting sites.
- Construct ponds and wetlands. Provide shallow water areas where aquatic emergent vegetation can grow.
- Control water level to provide open shallow water areas (stage 2 wetlands) adjacent to areas dominated by emergent aquatic (stage 3 wetlands) vegetation.

Water: Require water as described above.

Yellow-rumped Warbler

General Habitat Preference:

Associated with stages 4 (with aspen trees), 5, and 6 of plant succession.

Habitat Requirements:

Food: Mainly insects (ants, caterpillars, and beetles) that are gleaned from branches and leaves of trees and shrubs.

- Selective-cut forest management in large expanses of stage 6 woodland can increase the amount of insects.

Cover: Nest in both coniferous and deciduous trees. Occasionally nest in shrubs. Nest is placed on small branches from 10 to 30 feet above the ground and is made of twigs, bark strippings, and weed stems. Trees and shrubs also provide hiding and protective cover.

- Livestock grazing should be managed so that adequate shrub cover is maintained.
- Selective-cut forest management in large expanses of stage 6 woodland encourages the growth of shrubs and young trees that will provide future cover for this species.
- Plant trees and shrubs in large areas of stages 3 and 4 of plant succession.

Water: Usually obtain necessary water from diet, but will use other water sources when available.

Mammals

Beaver

General Habitat Preference:

Riparian areas in stages 4 and 5 of plant succession, and wetlands that have permanent water with a variety of shrubs and trees adjacent to the water.

In some areas beaver are a nuisance. They can cut down trees that people want to save, and they can dam up ditches and streams in undesirable places.

Habitat Requirements:

Food: Primarily the bark and wood of shrubs and trees, also some forbs and grasses. Store shrub and tree cuttings in caches (piles of branches) for use during the winter.

- Plant willows, other shrubs and deciduous trees near water that can be used by beaver. If beaver are already in the area, new plantings will need protection or the beaver temporarily removed while plantings become established.
- Livestock grazing should be managed so that shrubs and trees are maintained adjacent to waters that may be used by beavers. This may include developing livestock watering facilities in upland areas to discourage congregation in and overuse of riparian areas.
- Control beaver populations. Harvest more or less. Beaver can become too numerous and eat all available shrubs and trees. To prevent this from happening it may be necessary to periodically remove some beaver.

Cover: Beaver construct lodges from sticks and mud or dig burrows in banks of streams and rivers. Beaver prefer slow-moving or still water with a constant water level. Will build dams from tree branches, shrubs, and mud to form ponds which stabilize water levels, slow water movement and provide shelter beneath the ice in winter.

Protect and maintain beaver dams. When beavers construct dams in places that cause problems for people, removal of the beaver is usually the best solution. If the dam is destroyed and the beaver remain they will usually build the dam again.

Provide dam building material such as precut logs and branches in areas where such materials are scarce.

Water: Water requirements are discussed under cover requirements. Should be of sufficient depth (5 feet) to allow free movement under the ice in winter.

Desert Cottontail

General Habitat Preference:

In regions where succession occurs, stages 2, 3, and 4 of plant succession. In the Hot Desert Region, they use areas with thick shrub cover interspersed with open areas. Riparian and urban areas are used. Cottontails do not travel far. Cover and food should be close together.

Habitat Requirements:

Food: A variety of forbs and grasses are eaten from spring through fall. In winter often eat bark and twigs of shrubs.

- Control burn small areas (10 acres maximum) in large expanses of stage 4 vegetation. This practice is not recommended in the Hot Desert Region.
- Brush chop, chain, root plow or roller beat small areas (10 acres maximum) in large expanses of stage 4 vegetation. In areas dominated by mesquite, root plowing combined with seeding of grasses and legumes may be the most effective way to revert succession to stage 3. In the Woodland Region, chaining small areas in large areas of stage 5 and 6 vegetation can increase available food.
- Plant food strips of perennial grasses and forbs next to shrubby areas that provide cover (irrigate if necessary).
- Manage livestock grazing to leave some forbs and grass available for food.

Cover: Use thick shrub vegetation or burrows in the ground for hiding and nesting cover.

- Construct brush piles in areas with little cover.
- Plant shrubs on idle lands (irrigate if necessary). This is also appropriate for large open areas in urban settings, such as parks and golf courses.
- Manage livestock grazing to protect shrubs used for cover. This may include the development of livestock watering facilities in upland areas to discourage the congregation and overuse of riparian areas.

Water: Obtain necessary water from diet.

Eastern Cottontail

General Habitat Preference:

Stages 3 and 4 of plant succession. Ideally, habitat components made up of 1/3 grassland, 1/3 cropland, and 1/3 shrub cover all interspersed together. Also use parks, golf courses, and stream corridors in urban areas.

Habitat Requirements:

Food: A variety of forbs and grasses are eaten from spring through fall. In winter often eat bark of shrubs and trees.

- Plant 1/8 to 1/4 acre annual food crops (grain sorghum is good) in areas with too little cropland. One plot per 15 acres maximum.
- Plant 1/8 to 1/4 acre perennial food crops (grass and clover) in areas with too little grassland. Again, 1 plot per 15 acres maximum.
- Brush chopping, chaining, roller beating and controlled (prescribed) burns can be used to maintain or rejuvenate small areas of stage 3 and 4 vegetation. In areas dominated by mesquite, root plowing combined with the seeding of grasses and legumes may be the best way to maintain small areas in stage 3 vegetation.
- Clear-cut small areas (10 acres maximum) in large expanses of stage 5 and 6 woodlands.
- Livestock grazing management should avoid use of food and cover plots, and leave ample amounts of herbaceous vegetation in other areas used by cottontails for food and cover.

Cover: Use thick shrub or herbaceous vegetation for hiding and resting cover.

- Plant shrubs in large areas of stage 2 and 3 of plant succession, or in agricultural areas having few trees or shrubs. Plant along field borders, fence rows, or other idle land areas. This is also appropriate for open areas in urban settings.
- Provide brush piles where additional cover is needed.

Water: Obtain necessary water from diet.

Eastern Fox Squirrel

General Habitat Preference:

Stages 5 and 6 of plant succession with interspersed small openings (stages 2 and 3 of plant succession). Riparian areas are important in the Midwest. They also use urban areas with lots of trees.

Habitat Requirements:

Food: Spend much time foraging on the ground. Feed on a variety of nuts, acorns, seeds, mushrooms, bird eggs, and, in places, corn.

- Selective-cut timber management in large expanses of stage 5 and 6 woodlands. Leave 3 to 4 den trees and several other mature trees per acre.
- Clear-cut small patches (less than 5 acres) in large expanses of stage 6 woodland.
- Brush chopping and controlled (prescribed) burns can be used to maintain small areas in stage 3 and 4 vegetation.
- Plant mast-producing trees along fence rows, adjacent to streams, or in other idle land areas. When possible, locate plantings adjacent to existing croplands.
- Leave some grain unharvested in croplands adjacent to trees.
- Leave some crop residue untilled in the fall, especially near woodlands.
- In urban areas, corn or sunflower seeds can be spread out on ground under trees used by squirrels.

Cover: Nest in cavities in trees or build a nest out of twigs and leaves. Nest is usually placed in the crotch of a tree over 30 feet above the ground. In areas where den sites are scarce, will use nest boxes.

- Need 3 to 4 den trees or suitable nest boxes per acre. Nest boxes are most beneficial in stage 5 woodlands and urban areas lacking den sites.
- Plant trees in large areas of stages 2, 3, and 4 vegetation (irrigate if necessary).
- Manage livestock grazing in riparian areas to maintain large deciduous trees and provide adequate herbaceous vegetation.

Water: In warm seasons need water daily.

- In urban areas provide a pool or pan of water if other sources are not available.

Eastern Gray Squirrel

General Habitat Preference:

Deciduous woodland in stages 5 and 6 of plant succession.

Habitat Requirements:

Food: Spend much time foraging on the ground. Feed on a variety of nuts, grains, acorns, seeds, mushrooms, and buds.

- Leave some grain unharvested (corn preferred) and/or eliminate fall tillage of croplands adjacent to stage 5 and 6 vegetation.
- Selective-cut timber management in large expanses of stage 5 and 6 woodlands. Leave 3 to 4 den trees and several other mature trees per acre.
- Plant mast-producing trees along fence rows, adjacent to streams, or in other idle land areas. When possible, locate plantings adjacent to existing croplands.
- Livestock grazing should be managed to maintain adequate forage on forest floor. Maintain deciduous tree corridors along streams.

Cover: Nest in cavities in trees or build nests out of twigs and leaves. Nest is usually placed in the crotch of a tree over 30 feet above the ground. In areas where den sites are scarce, will use nest boxes.

- Need 3 to 4 den trees or suitable nest boxes per acre. Nest boxes are most beneficial in stage 5 woodlands.

Water: In warm seasons require water daily.

Marten

General Habitat Preference:

Stages 5 and 6 of plant succession. Most abundant in mature conifer forests.

Habitat Requirements:

Food: Small mammals that live in forests such as voles and squirrels are most common food. Also eat small birds, insects, and berries.

Cover: Old growth forests provide all cover requirements, however, forests comprised of trees that vary in size and age provide better interspersion of hunting sites (food) and protective cover.

- Selective-cut forest management in large expanses of stage 6 woodlands can improve available food and cover.

Water: Water requirements are not known. Probably obtain sufficient water from diet. In the regions marten are found, water is plentiful.

Mink

General Habitat Preference:

Prefer habitat associated with stream and river banks and the shores of a variety of wetlands.

Habitat Requirements:

Food: Rabbits, mice, waterfowl, muskrats, fish and crayfish are all used for food depending on availability. Most food is found in close association of dense vegetation along the shores of wetlands.

- Manage livestock grazing to maintain healthy vegetation along the banks and shores of streams, rivers, and other wetlands. In some regions this may include the development of livestock watering facilities in uplands to discourage congregation in and overuse of riparian areas.
- Controlled (prescribed) burns and brush chopping can be used to rejuvenate old decadent wetland vegetation that in turn can improve the habitat for the animals mink use for food.
- Control water levels with water control structures to promote the growth of emergent aquatic vegetation adjacent to open water.
- Ponds and wetlands can be constructed with shallow water areas where emergent aquatic vegetation can grow.
- Provide shallow water areas in ponds and wetlands where emergent vegetation can grow.
- Small dikes can be used to temporarily flood areas which can improve habitat for animals mink use for food.

Cover: Use dens made in log jams, under tree roots, old muskrat burrows, and rock piles. The availability of den sites is considered to be a key factor in determining how many mink use an area. Areas with lots of trees and shrubs and limited livestock grazing near shorelines usually have more potential den sites.

The practices discussed under Food can also improve cover.

Water: Mink are found in association with water.

Mountain Cottontail

General Habitat Preference:

Stages 2, 3, and 4 of plant succession. Cottontails do not travel far. Cover and food should be close together.

Habitat Requirements:

Food: A variety of forbs, grasses, seeds, and fruits are eaten in spring through fall. In winter often eat bark and twigs of shrubs and young trees.

- Clear-cut small areas (10 acres maximum) in large expanses of stage 5 and 6 woodland.
- Control burn small areas (10 acres maximum) in large expanses of stage 4 vegetation.
- Brush chop, chain, or roller beat small areas (10 acres maximum) in large expanses of stage 4 vegetation.
- Plant small food strips of perennial grass and forbs next to shrubby areas that provide cover.
- Livestock grazing management should avoid use of food and cover plots and leave ample amounts of herbaceous vegetation in other areas used by cottontails for food.

Cover: Use thick shrub vegetation or burrows in ground for hiding and nesting cover.

Same as Clear-cut under Foods. Cover benefits from this management practice will not be realized until shrubs become established.

- In large open areas with little cover, brush piles can be constructed. Place slash from timber harvest in piles.
- Plant shrubs.

Water: Obtain necessary water from diet.

Mule Deer

General Habitat Preference:

Stage 3 and 4 of plant succession. In Desert Region use riparian areas the most.

Habitat Requirements:

Food: Varies with season and availability. Often eat slightly more brush (browse) than grass or forbs. In summer eat grass, forbs, and brush. In fall eat grass and brush. In winter eat brush and grass, in deep snow brush is more available. In spring prefer grass and forbs.

- Control burn small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 4 and 5 vegetation.
- Brush chop, chain, or roller beat small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 4 vegetation. Do not do this in areas of deep snow if shrubs are the only available food in winter.
- Clear-cut small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 5 and 6 woodland. Clear-cuts should be narrow and irregularly shaped.
- Fertilize areas of stage 4 vegetation that are used heavily in the winter.
- Plant fields to grasses and legumes.
- Livestock grazing should be managed so that some herbaceous and shrub vegetation remains available for deer. This may include the development of livestock watering facilities in uplands to discourage congregation in and overuse of riparian areas.

Cover: Will use tall thick shrubs, forests and land features such as rock outcrops, cliffs, and ravines.

Manage for 50 percent stage 5 and 6 vegetation intermingled with stage 3 and 4 vegetation.

- Manage livestock grazing in riparian areas to maintain shrubs and trees. Grazing when woody vegetation is not growing rapidly (fall to late winter) usually does less damage than at other times of year.
- Plant willows and trees.

Water: Need nearly daily in dry regions and during summer months. In winter need only if snow is absent. Will travel up to 2 miles for water, but prefer within 1 mile.

- Where water is limited or absent, development of water sources is desirable.

Guzzlers
Catchment ponds
Windmills
Spring developments

Muskrat

General Habitat Preference:

Stages 2 and 3 wetlands interspersed (mixed) together.

Habitat Requirements:

Food: Eat the roots, tubers, and green vegetation of emergent aquatic vegetation such as cattails and bulrushes.

- Manage livestock grazing to maintain healthy vegetation along the banks and shores of streams, rivers, and other wetlands. In some regions this may include the development of livestock watering facilities in uplands to discourage congregation in and overuse of riparian areas.
- Controlled (prescribed) burns and brush chopping can be used to rejuvenate old, decadent wetland vegetation.
- Control water levels with water control structures. Provide areas in wetland with water less than 2 feet deep where cattails and bulrushes can grow. Up to 80 percent of the wetland should be able to grow such vegetation.
- Ponds and wetlands can be constructed with shallow water areas where emergent aquatic vegetation can grow.
- Provide shallow water areas in existing ponds and wetlands where emergent vegetation can grow.
- Small dikes can be used to temporarily flood areas to promote the growth of cattails and bulrushes.

Cover: Build lodges out of bulrushes and cattails which are usually placed in dense growths of cattails and bulrushes. Rest on open shorelines, floating logs, or on tops of lodges. Also make dens in banks.

Practices under Food can provide areas for lodges.

Floating logs and rafts can be placed in open water areas. They should be anchored to the bottom.

Water: Need water of sufficient depth (4 feet) or flowing water that allows free movement under ice during the winter. During warm seasons, prefer water 1 to 2 feet deep, with around 20 percent of the wetland comprised of open water free of emergent aquatic vegetation. Again, controlling the water level when possible can be a beneficial management practice.

Pronghorn

General Habitat Preference:

Stages 3 and 4 of plant succession interspersed with each other. Fifty percent of the habitat in each stage is desired.

Habitat Requirements:

Food: A variety of forbs and shrubs. Diet varies with season. Shrubs are heavily utilized in the winter, while forbs are used mostly in the spring and summer.

- Control burn areas in large expanses of stage 4 shrub land, especially in areas where shrubs are dominating. Maintain 50 percent of range in stage 4 of plant succession.
- Brush chop or chain areas in large expanses of stage 4 shrub land.
- Livestock grazing management may be needed to avoid grazing parts of the range in the spring and summer. Can rotate areas to be excluded from grazing each year. This type of grazing system is often called "rest-rotation". A disadvantage is that the amount of fence often needed for livestock control can have adverse effects on pronghorn.

Fencing should be kept to a minimum. When built, there should be a minimum of 16 inches between the ground and the bottom wire which should be smooth. The top wire should not be over 42 inches above the ground.

Maintain large blocks of rangeland within cropland areas. Up to 30 percent of the area can be cropland.

- Plant fields of grasses and legumes in large expanses of stage 4 vegetation.

Cover: Need flat to rolling terrain that allows pronghorn to see long distances.

Water: Need water frequently. Will travel up to 4 miles for water, however, available water within 2 miles is desirable. Use snow if available.

- Where water is limited or absent, development of water sources is desirable.

Catchment ponds
Dugouts
Windmills
Spring developments

Raccoon

General Habitat Preference:

Most abundant near water, riparian areas and lands adjacent to wetlands. Also found in urban areas. Prefer areas interspersed with different successional stages. Riparian areas in stages 5 and 6 of plant succession are ideal.

Raccoons can become pests in urban areas and in wetlands where waterfowl nesting is important. In such instances, the management objectives may be to make the habitat less suitable for raccoons.

Habitat Requirements:

Food: Eat a wide variety of foods consisting of garbage, birds, eggs, fish, small mammals, insects, crayfish, grains, seeds, fruits, and foods prepared for human and pet consumption.

- Manage livestock grazing to maintain healthy vegetation along the banks and shores of streams, rivers, and other wetlands. In some regions this may include the development of livestock watering facilities in uplands to discourage congregation and overuse of riparian areas.
- Controlled (prescribed) burns and brush chopping can be used to rejuvenate old decadent wetland vegetation. These practices along with chaining and roller beating can be used to revert succession from stages 5 and 6 vegetation to stages 2, 3, and 4.
- Control water levels with water control structures. Provide areas in wetland with water less than 2 feet deep where aquatic emergent vegetation can grow.
- Ponds and wetlands can be constructed with shallow water areas where emergent aquatic vegetation can grow.
- Provide shallow water areas in existing ponds and wetlands where emergent vegetation can grow.
- Leave small areas of grain crops adjacent to woodlands unharvested.
- Plant annual food plots to grains.
- Clear-cut small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 5 and 6 vegetation.
- Selective-cut timber management.

Cover: Nest and rest during the day in natural tree cavities, dens in the ground, under brush and junk piles, in old abandoned buildings, and rocky cliffs and ledges.

- Plant and maintain large deciduous trees especially in riparian areas and areas adjacent to wetlands.

Water: Require water frequently during warm seasons.

- Build ponds or wetlands.
- Provide pools of water in urban areas.

Red Squirrel

General Habitat Preference:

Stages 5 and 6 of plant succession.

Habitat Requirements:

Food: Seeds of conifer trees, nuts, fruits, eggs, and mushrooms.

- Selective-cut timber management in large expanses of stage 6 woodland can increase the variety of available foods.

Cover: Nest in natural tree cavities, old woodpecker holes, or build nests out of twigs, leaves, and shredded bark. Nests are built on large tree limbs close to the trunk. Maintenance of trees provides cover.

- Livestock grazing should be managed to maintain some available food for wildlife.

Water: Require water regularly. In regions where red squirrels are found there is usually an adequate supply of water.

Varying Hare (Snowshoe)

General Habitat Preference:

In Subalpine Zone, stages 5 and 6 of plant succession with thick shrub layer. In the Northeast Mixed Forest Region stage 5 of plant succession.

Habitat Requirements:

Food: Buds, leaves, and bark of shrubs and trees.

- In mature forests with few shrubs, selective-cut timber management can increase the shrub layer.
- Livestock grazing should be managed so that some food is available for hares.

Cover: Thick shrub and herbaceous layers are used for cover.

- In mature forests with thin or no shrub layers, selective-cut or small patch-cut timber management can improve cover.

Water: Require water regularly. In regions where varying hare are found, there is usually an adequate supply of water. In the summer they are often found near wet areas of the forest.

Wapiti (Elk)

General Habitat Preference:

Stages 3 and 4 of plant succession intermingled with stages 5 and 6.

Habitat Requirements:

Food: Perennial grasses are used the most but also eat substantial amounts of shrubs and forbs.

- Control burn small areas (40 acres maximum) in large expanses of stage 4 and 5 vegetation.
- Brush chop, chain, or roller beat small areas (40 acres maximum) in large expanses of stage 4 vegetation.
- Clear-cut small areas (40 acres maximum) in large expanses of stage 5 and 6 forests.
- Selective-cut timber management in stage 6 forests.
- Plant fields to grasses and legumes in large expanses of stage 4 vegetation. Most effective when done in areas used in the winter.
- Livestock grazing management should leave ample forage available for use by wapiti.

Cover: Use thick shrubs and various woodlands for hiding and calving cover.

Maintain 40 percent of area in stage 5 and 6 vegetation. Blocks of forest do not need to be larger than 100 acres.

Strips of stage 5 and 6 vegetation connecting large blocks of stage 5 and 6 vegetation should be maintained for use as travel corridors.

Water: Use water regularly in the summer. Areas with water within 1/2 mile are preferred.

- Where water is limited or absent, development of water sources is desirable.

Catchment ponds
Spring developments
Dugouts
Windmills

White-tailed Deer

General Habitat Preference:

Stages 3, 4, and 5 of plant succession all interspersed together.

Habitat Requirements:

Food: A variety of shrubs, forbs, grasses, and waste grain. Acorns and nuts are favorite foods. In the northern parts of its range, conifer trees are used in the winter.

- Clear-cut small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 5 and 6 woodlands.
- Selective-cut timber management of stage 5 and 6 woodlands.
- Plant several 1 acre perennial food plots of grass and clover in large expanses of stage 5 and 6 woodland.
- Plant annual food plots to grain.
- Plant mast trees.
- Leave small areas of cropland adjacent to woodlands unharvested.
- Eliminate fall tillage of grain crop residue adjacent to woodlands.
- Plant fields to grasses and legumes in large expanses of stage 4, 5, and 6 vegetation.
- Controlled burning at three-year intervals in stage 5 pine woodlands or periodically in stage 3 and 4 vegetation.
- Brush chop small areas to maintain stage 3 and 4 vegetation.
- In areas dominated by mesquite, root plowing combined with the seeding of grasses and legumes may be the best way to maintain small areas in stage 3 vegetation.
- Manage livestock grazing to leave some forbs, grasses, shrubs, and trees available for food and cover. This is particularly important in riparian areas in the Great Plains Grassland Region. May include the development of livestock watering facilities in upland areas to discourage congregation of livestock and overuse in riparian areas.

Cover: Use woodlands and tall shrubs for hiding and travel cover. Also use tall emergent aquatic vegetation for cover in the Great Plains Grassland Region.

- Construct new wetlands and/or develop shallow water areas in existing ponds and wetlands where large areas of tall emergent aquatic vegetation can grow.
- Control water levels with water control structures, or use small dikes to temporarily flood areas to encourage the growth of tall emergent aquatic vegetation.
- Plant trees and shrubs in ravines, along field borders, and other idle land areas.

Water: Drink water when it is available, but can go for long periods without it.

Other Species

(Amphibians, Fish & Butterflies)

Bullfrog

General Habitat Preference:

Inhabit permanent bodies of standing or slow-moving water. Prefer shorelines with dense vegetation (Stages 3 & 4 of wetland succession), adjacent to shallow open water areas (Stage 2) dominated by floating and submerged aquatic vegetation. All habitat requirements are often found in and around a single pond.

Habitat Requirements:

Food: Major components of the diet are snails, insects, crayfish, other frogs, fish, reptiles, and occasionally small mammals and birds.

Cover: Use dense emergent aquatic and upland herbaceous vegetation adjacent to water for hiding and foraging.

- Construct ponds and wetlands with shallow water areas.
- Control water levels with water control structures to encourage the growth of emergent aquatic vegetation adjacent to open water.
- Provide shallow water areas in existing ponds and wetlands.
- Manage livestock grazing to maintain dense vegetative cover on shores and banks adjacent to water. Limit livestock watering access to only a small area of the wetland.

Water: Need stable water levels for hibernation and egg development.

- Control water level. When possible maintain a constant water level.

Special: Prefer a soft mud bottom under unfrozen water for hibernation.

Butterflies

General Habitat Preference:

In urban areas are found in gardens, yards, and parks planted with shrubs and flowers that attract butterflies. Often lay eggs on a specific kind of plant.

Habitat Requirements:

Food: Usually consists of sweet liquids such as nectar from flowers.

- Plant and maintain bushes and flowers that attract butterflies. Some examples are aster, verbena, zinnia, marigold, lilac, bush cinquefolia, and butterfly plant.
- Plant and maintain specific types of plants for butterflies to lay eggs on. Some examples are chokecherry and cottonwood for tiger swallowtails; dill, parsley, and carrot for black swallowtail; hollyhock and sunflower for painted lady; and clover for clouded sulfur butterflies.
- Rooftop and balcony gardens planted with some of the plants mentioned above may attract butterflies.

Cover: Need shelter from wind. Plant the above in areas sheltered from the wind.

Water: Some butterflies can be seen collecting on moist sand or mud around water puddles.

- Providing an area with water puddles may attract groups of these butterflies.

Frogs

General Habitat Preference:

Weeds and aquatic vegetation on the edges of ponds, lakes, and slow moving streams. Mud bottoms are needed so frogs can bury themselves for hibernation during the winter.

Habitat Requirements:

Food: Insects.

Cover: Thick herbaceous vegetation on bank or shore adjacent to water. Also hide among floating vegetation in the water next to shore.

- Construct ponds and wetlands. Both shallow water to encourage emergent aquatic vegetation and deep water for hibernation are desired. Small backyard pools are often adequate.
- Control water levels with water control devices to insure adequate water depth for hibernation. Also useful for encouraging emergent aquatic vegetation.

Water: Need water to hide. Many kinds of frogs will dry up and die if their skin is not kept moist. See discussion in Cover section.

Largemouth Bass/Bluegill

General Habitat Preference:

Ponds, lakes, and slow moving rivers.

Habitat Requirements:

Food: Young bass eat insects in their aquatic stages and other invertebrates that depend on phytoplankton for food. Adult bass eat other small fish such as bluegill and a variety of minnows, tadpoles, and crayfish. Bluegill eat a variety of insects, tadpoles, small minnows, and crayfish.

- Construct ponds.

Maintain a green color in pond water (green enough that a white disk cannot be seen 15 inches deep). The color is caused by phytoplankton (microscopic plant life).

- In clear water, fertilizer may be added to increase phytoplankton.

A bass to bluegill ratio of 3 to 6 pounds of bluegill to one pound of bass is considered a good fish population balance.

- Determine pond balance using a minnow seine.
- Harvest more or fewer bluegill depending on seine sample results.
- Harvest more or fewer bass.
- Remove existing fish and restock pond.
- Prevent or clear up muddy water (brown or gray color). Muddy water blocks sunlight needed in producing phytoplankton.
- Manage livestock grazing to maintain thick herbaceous vegetation surrounding pond and in watershed that drains into pond. Develop livestock watering facilities away from pond or allow access to only a small area of pond.
- Reseed watershed.

Cover: Are often found near submerged rocks, shrubs, and near aquatic vegetation where small fish (used for food) hide.

- Artificial reefs constructed of rock piles, sections of plastic or cement pipe (a minimum of 6 inches in diameter and 18 inches long), and brush piles (sunk with weight) can be used for additional cover. These practices are recommended for ponds larger than 10 surface acres in size.

Aquatic vegetation can become too abundant (over 30 percent of water surface covered).

- Deepening the pond edges to 2 feet deep or more discourages aquatic vegetation growth.

Water: Require an adequate quantity and quality of water.

- Stop pond leaks if and when they occur.
- Repair spillway if needed.
- Diversion ditches can be used to ensure an adequate water supply.
- Remove trees from dike or dam portion of pond.

Fish need water of a certain quality. Some of the basic requirements are: dissolved oxygen - minimum of 5 parts per million (ppm); carbon dioxide - should not exceed 20 ppm; pH should range between 7.0 and 9.0; and water temperature should reach at least 70 degrees Fahrenheit sometime during the summer (1 foot below surface in shade).

Test the water to see if it meets requirements.

Aerate pond to increase oxygen and decrease carbon dioxide.

- Lime ponds to increase pH if below 7.0.

Rainbow Trout

General Habitat Preference:

Cold water lakes, ponds and fast moving streams and rivers.

Habitat Requirements:

Food: Primarily insects, also eat snails, crayfish, and smaller fish. The amount of available food is often related to the quality of water and available habitat for insects. In streams and rivers, many aquatic insects need fast moving water (riffles) that is high in dissolved oxygen and a gravel or cobble bottom. Ideally a stream should have 50 percent riffles and 50 percent pools (slow moving water).

It is difficult to make riffles. Maintenance of riffles is important in streams with small amounts of riffles.

Place gravel and cobble in stream to provide habitat for insects. Placement should be done with care to avoid changing currents which could increase bank erosion.

Aquatic vegetation provides habitat for insects in ponds and lakes. Some aquatic vegetation should be maintained (not over 30 percent of surface area). Vegetation on banks and shores provides habitat for insects.

- Manage livestock grazing to maintain thick vegetation on banks and shores. Develop livestock watering facilities away from streams, rivers, lakes, or ponds. Or allow access in only small areas.
- Collect fish (seine. fishing rod, electroshock) and determine their health.
- Harvest more trout if lack of food is inhibiting growth.

Cover: In streams and rivers need pools for cover.

- Construct small rock or log dams. Changing a stream's flow can have bad side effects such as increased erosion. Design of such dams should be done by an expert who understands stream flows.
- Place large rocks in fast moving water. Again, locations should be selected with care.

Water: Rainbow trout need high quality water. Some basic requirements are: dissolved oxygen - minimum of 5 parts per million (ppm); carbon dioxide - should not exceed 10 ppm; pH should range between 7.0 and 9.0; and water temperature should not exceed 70 degrees Fahrenheit at any time (1 foot below surface in shade).

Test the water to see if it meets requirements. For ponds and lakes these tests are important in the winter when ice prevents aquatic plants from receiving sunlight.

Aerate to increase oxygen and decrease carbon dioxide.

- *All practices related to ponds discussed under large-mouth bass and bluegill may be applicable to ponds for trout.*

Wildlife Management Practices (WMP)

In this section, various practices used to manage habitat are described in further detail. They are listed in alphabetical order. The descriptions are brief and general and are not meant to be comprehensive.

Identify and learn the practices that are recommended for the species listed in the *Regions* section. When preparing for a judging event, it is only necessary to learn the information recommended for the particular regions that will be used in the event. Many of these practices are commonly used in certain regions and not others. Study only the appropriate practices that are listed on the chart found in the particular description of the region that you are using. It is always wise to learn as much as possible about any practice before implementing it. Additional reading, research, and guidance from wildlife management professionals is suggested.

Some of the practices may seem contradictory. For example, Practice 25 – Ponds, Deepen Edges discourages the growth of emergent aquatic vegetation, while Practice 34 – Ponds/ Wetlands Provide Shallow Water encourages growth. Landowner objectives will determine which practices you recommend.

At times the best habitat management is maintaining an area in its current condition. This can include protecting the area from development and applying various management practices which will help maintain the area in the desired condition.

In this handbook, costs and budgets are not considered when recommending practices. However in actual situations, wildlife managers must consider economics when planning and recommending management practices.

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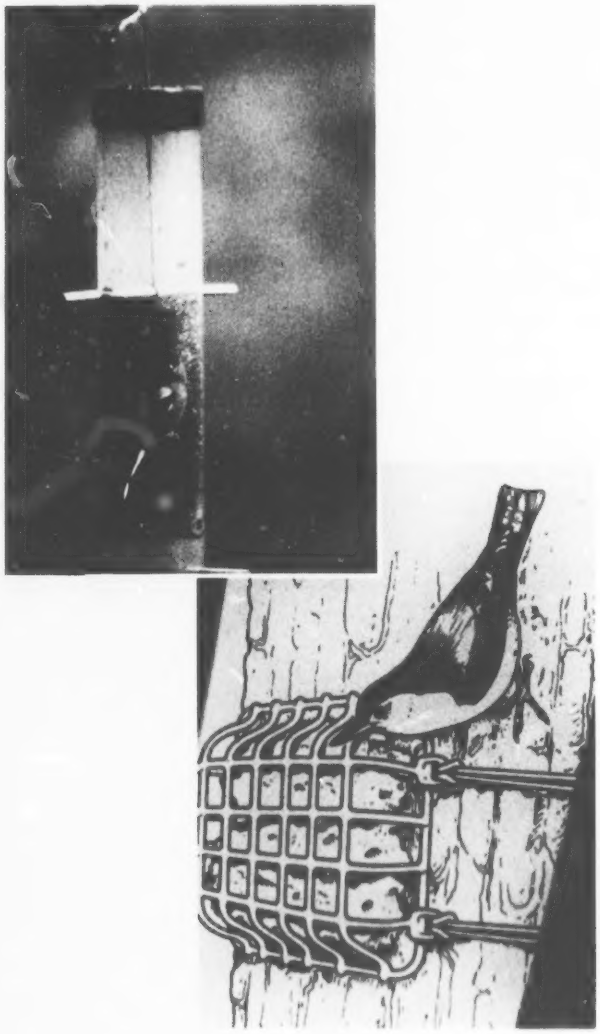
1. *Artificial Feeders*

General Description:

Used primarily to feed wildlife in urban areas. A wide variety of feeder designs, methods, and different foods exist. Sunflower seeds and white proso millet are universal favorites. Some species prefer to eat fat rather than seeds. Some prefer to eat on the ground rather than in a tree or on a balcony. For details on different designs and placement of artificial feeders see Cooperative Extension agent or state wildlife agency.



2. *Brush Chopping (Mowing)*

General Description:

Involves mowing dense vegetation (including fairly large shrubs) with a large rotary mower mounted behind a tractor.

Effect on Habitat:

- Helps keep vegetative succession in stage 2.
- Helps keep vegetative succession in stage 3.
- Sometimes reverts succession from stage 4 to stage 3. Helps remove competition with some kinds of shrubs allowing grasses and forbs to grow better.
- Sometimes helps keep vegetative succession in stage 4. Maintains low shrub growth with some kinds of shrubs by encouraging resprouting.
- In stages 2, 3, and 4, helps rejuvenate grasses, forbs, and shrubs which improves quality of future nesting sites.
- In stages 5 and 6, maintains dense low understory in properly thinned woodlands.
- In grass-clover plots, helps keep vegetation low enough for use by some wildlife species such as doves and turkeys.
- In wetlands can be used to increase interspersion by reducing vegetative cover.

This practice is used in stage 5 and 6 vegetation in the following regions: Eastern Deciduous Forest, Northeast Mixed Forest, Southeast Mixed and Outer Coastal Plain Forest, and Woodland areas found within the Great Plains Grasslands Region.

3. Brush Piles

General Description

Brush piles can be made from saplings or tree branches available from land clearing, timber harvest operations, tree pruning, etc. For best results, piles should be 3 to 5 feet high, 15 feet in diameter and very loose. This will allow grass and forbs to grow in them, creating more food and cover for wildlife.

Effect on Habitat:

- Particularly useful for rabbits and quail in areas with little cover, especially in areas with plenty of food and little cover such as corn, soybean, grain sorghum, and small grain fields.
- Useful at the edge between fields and woodlands.

4. Chaining/Roller Beating

General Description:

Chaining: A large chain is strung between two bulldozers that run parallel to each other (50 to 100 feet apart depending on length of chain). The chain knocks down shrubs and small trees.

Roller Beating: Large, sharp metal blades are welded lengthwise on a roller similar to those seen on steam rollers used to pave roads. The roller is pulled behind bulldozers to knock down and chop up large shrubs and small trees. Roller beating is an alternative to chaining and has nearly the same effects on vegetation.

Both techniques are used where rugged terrain, rocks, or large shrubs prevent the use of a brush chopper. This practice is not used like brush chopping to manipulate understory vegetation in woodlands.

Effect on Habitat:

- Stage 4 sometimes reverts succession to stage 3. Helps remove competition of some kinds of shrubs allowing grasses and forbs to grow better.
- Stage 4 sometimes helps keep vegetative succession in stage 4.
- Maintains low shrub growth with some kinds of shrubs by encouraging resprouting.
- In stages 5 and 6, causes succession to revert back to stages 3 and 4.

Most often used in stages 4, 5, and 6 of plant succession in the following regions: Mediterranean, Intermountain Foothills, Intermountain Montane, Intermountain Sagebrush, and Woodland.

Chaining

Roller beating

5. Controlled (Prescribed) Burning

General Description:

Burning should be done under cool, moist, low-wind conditions, when danger of wildfire is low. Burn as early in the spring (before April 1 if possible) as conditions permit, so ground nesting wildlife are not disturbed. Do only under close supervision of wildlife, forestry, and/or range professionals that have experience with controlled burns.

Results vary with the type of vegetation being burned, burning conditions, and the frequency of burning.

Some General Effects of Fire Are:

- Some understory shrubs sprout.
- Some shrubs are reduced which improves the vigor and quality of forbs and grasses.
- Releases nutrients in soil.
- Reduces excessive dead vegetation (leaves, old grass, etc.) so seed can reach mineral soil.
- Scarifies (breaks down outside coating) some seeds so they can germinate.
- Rejuvenates grass and herbaceous vegetation making area more productive.

Effect on Habitat:

Annual Burning:

- Stage 2 helps keep vegetative succession in stage 2.
- Stage 3 helps keep vegetative succession in stage 3.
- Stage 4 causes succession to revert to stage 3.
- Stage 5, in pines, keeps understory shrubs thinned out and stimulates grassy-weedy undergrowth if stands are properly thinned.
- Stage 6 is the same as stage 5.

Annual burning in stage 5 and 6 vegetation is a practice used most often in the following regions: Eastern Deciduous Forest, Northeast Mixed Forest, Southeast Mixed and Outer Coastal Plain Forest.

3- to 5-Year Interval Burning:

- Stage 2 allows succession to progress, but more slowly than if left alone.
- Stage 3 usually keeps vegetative succession in stage 3.
- Rejuvenates grass and grass-like vegetation in stage 3 and 4 wetlands.
- Periodic burning of vegetation-choked wetlands can improve the water and cover interspersion.
- Stage 4 makes shrub growth more dense due to abundant sprouting of shrubs.
- Stage 5, in pines, stimulates thicker understory shrubs if stands are properly thinned.
- Stage 6 is the same as stage 5.

Three to five-year interval burning in stage 5 and 6 vegetation is a practice used most often in the following regions: Eastern Deciduous Forest, Great Plains Grasslands, Northeast Mixed Forest, Southeast Mixed and Outer Coastal Plain Forest.

15- to 25-Year Interval Burning:

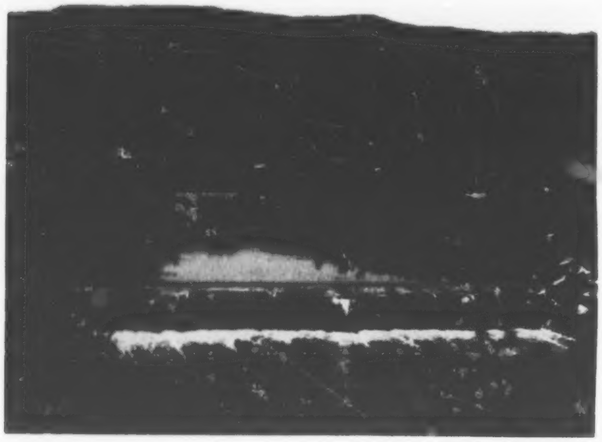
- Maintains vegetative succession in stage 4 in areas dominated by fire-tolerant shrubs, such as Gambel oak, mesquite, manzanita, chamise, serviceberry, and mountain mahogany.
- Rejuvenates old, decadent shrubs stimulating new growth.
- Reverts succession to stages 2 or 3 in areas dominated by fire-intolerant shrubs, such as sagebrush.

Used primarily in stage 4 of plant succession in the following regions: Mediterranean, Woodland, Intermountain Foothills, Intermountain Montane, and Intermountain Sagebrush.

6. Dams, Rock or Log

General Description:

Small (less than 1.5 feet high) dams are built across streams to raise the water level and create pools. Any structures put in a stream have potential to alter stream currents in an undesirable manner. The placement and design of such dams should be done by people who have experience with this practice.



Effect on Habitat:

- Used to create pools for fish to hide and rest. If designed properly can be used to reduce some kinds of stream erosion.
- Used in areas with considerably more riffles than pools.

7. Disking

General Description:

Areas in successional stages 2, 3, and 4 can be disked to promote the growth of annual and perennial forbs and grasses.

Effect on Habitat:

- Keeps vegetative succession in stage 2.
- Promotes the growth of annual forbs that some wildlife prefer for food and cover.
- In stage 3, causes succession to revert to stage 2.
- In stage 4, causes succession to revert to stages 2 or 3.
- Can be used to decrease, vegetative cover and increase interspersion in wetlands (during dry periods).

8. Fertilize Vegetation

General Description:

A practice generally recommended for mule deer in the western regions of the United States.

Improves the nutritional quality of vegetation used for forage, especially in areas heavily used during the winter.

Broadcast 100 pounds of actual nitrogen per acre every 3 to 4 years.

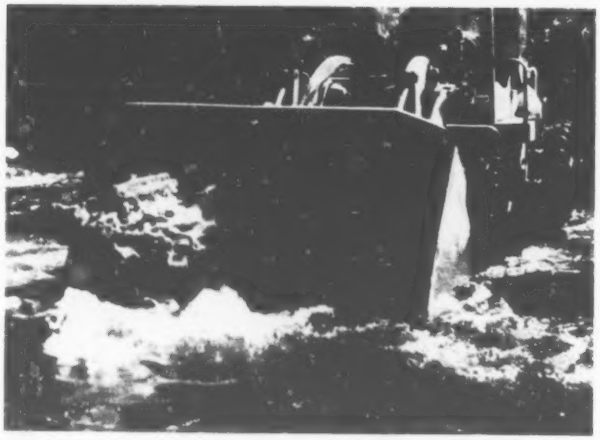
9. Fish Rocks

General Description:

Large boulders are placed in streams (with hard bottoms) to improve fish habitat. The rocks need to be large enough so that small floods will not move them. This practice may cause undesirable changes in the stream flow. Location and placement of the rocks should be done under the guidance of someone with experience.

Effect on Habitat:

- Creates pools of deep and slow-flowing water used by trout for resting and hiding.
- Used in areas with considerably more riffles than pools.



10. Grain, Leave Unharvested

General Description:

Strips or blocks of grain crops (1/8 to 1/4 acre is usually sufficient) can be left unharvested. Especially valuable if left adjacent to herbaceous, shrub, or tree cover.

Effect on Habitat:

- Provides a food source for many species of wildlife.

11. Harvest Less

Bass:

Needed when seine sample of pond reveals these situations:

- No recent bluegill hatch.
- Many medium-sized bluegill in poor condition.
- Bass few, large, and in good condition.

Bluegill:

Needed when seine sample of pond reveals these situations:

- Many recently hatched bluegill.
- Very few medium-sized bluegill.
- Bass less than one pound in poor condition.
- No young bass.

Trout:

Needed when seine, fishing rod, or electroshocking samples reveal these situations.

- Fish in good condition. Few medium and large sized fish. Many small fish.

Game Birds and Mammals:

- Used when there is a high proportion of young animals in the bag and hunting success is low. May apply to local situations, but not needed for small animal management in general.

12. Harvest More

Bass:

Needed when seine sample of pond reveals these situations:

- Many recently hatched bluegill.
- Very few medium-sized bluegill.
- Bass less than one pound in poor condition.
- No young bass.

Increase bass harvest cautiously. Spread the harvest over the entire summer.

Bluegill:

Needed when seine sample of pond reveals these situations:

- No recent bluegill hatch.
- Many medium-sized bluegill in poor condition.
- Bass few, large, and in good condition.

Trout:

Needed when seine, fishing rod, or electroshocking samples reveal these situations :

- Many fish, small (even older ones) and in poor condition. In many areas extremely cold water reduces trout growth. In these situations harvesting more will not help much.

Game Birds and Mammals:

Needed when animals show signs of overpopulation such as:

- Disease.
- Destruction of habitat by crowded animals.
- Poor body condition.
- Excessive fighting.
- Few young animals in bag.
- Higher percentage of older animals than young in fall population (indicates poor reproduction due to inadequate nutrition; thinning population will leave more food to go around). May apply to local situations, but not needed for small animal management in general.

13. Harvest Timing

General Description:

When possible, avoid harvesting crops during nesting and fawning seasons to reduce nest destruction and mortality.

In most situations it is not possible to avoid harvesting during the entire nesting season, but any significant delay can be a benefit.

14. *Lime Ponds and Fields*

General Description:

When water quality tests show the pH is below 7.0 it should be adjusted to 7 to 8 by using agricultural lime. Lime can also be added to food plots when soil tests recommend.

This practice is not used often in the western United States as many of the soils already have a high pH.

15. *Livestock Grazing Management*

General Description:

A practice for managing the use of vegetation by livestock. Can be used to manipulate successional stages to benefit wildlife (i.e. maintain open areas in woodlands). This practice also includes livestock exclusion when necessary.

Some General Principles Are:

Proper Grazing Use: On native rangelands and riparian areas, do not graze more than 50 percent of the yearly growth of vegetation preferred by livestock.

Timing: Avoid grazing areas during periods when wildlife and/or vegetation is vulnerable to damage. *Examples* — Grazing riparian areas in the summer can damage young shrubs and trees; grazing in spring can reduce cover needed by ground-nesting wildlife.

Intensity: Relates to how many livestock are on a given area at any one time. Many livestock on an area is high intensity, few livestock is low intensity.

High intensity grazing should be for shorter periods of time or all the vegetation will be used.

High intensity grazing increases the chance that ground nests will be trampled, and should not be used in important nesting areas during the nesting season.

Rotation: Livestock should be moved from an area before vegetation is over-used. The vegetation is allowed to recuperate (rest) before it is grazed again.

Tools:

Fencing, water developments, salting, and herding are the most common methods used to control livestock grazing. Whenever livestock grazing management is recommended, it is implied that the necessary tools will be available. Some information on these tools follows.

Fencing: Useful to protect food plots, ponds, woodlands, or other natural vegetation areas from livestock. Often necessary for managing livestock grazing (such as rotating areas being grazed, controlling access to water, etc.)

Fences interfere with movement of wildlife, especially large animals such as pronghorn, deer, and elk. They should be recommended only when necessary and designed to allow movement of wildlife.

The top wire should be a maximum of 42 inches above the ground (allows some wildlife to jump over) and the bottom wire should be smooth and a minimum of 16 inches above the ground (allows some wildlife to go under).

Water Developments: Can be used to distribute livestock grazing in semi-arid and arid regions of the United States. The more watering places available, the less likely livestock will concentrate in one area, and the more flexibility one has in managing livestock. Alternative water sources are often essential when developing grazing systems that permit occasional rest of important areas (i.e. riparian areas) during critical growing seasons.

Catchment ponds, dugouts, windmills, and spring developments discussed under Practice 42-Water Developments for Wildlife are also used to develop water for livestock.

Salting: Locating salting areas away from watering places and occasionally moving locations can be used to encourage uniform distribution of livestock.

Herding: Using horseback or other means to move animals is useful for achieving proper distribution of grazing animals. Used to discourage congregation of animals in attractive areas for long periods of time.

Effect on Habitat:

- Used to insure livestock grazing does not over-utilize vegetation which is also used by wildlife.
- If properly managed, livestock grazing is usually not harmful to wildlife habitat and in some instances, is used to improve wildlife habitat.
- Changes in grazing management are recommended only when it is evident that livestock use is damaging wildlife habitat or is needed to improve the habitat for selected wildlife species.
- Periodic grazing of vegetation (cattail) choked wetlands can improve water and vegetation interspersion.

16. Nesting Boxes Structures/Platforms

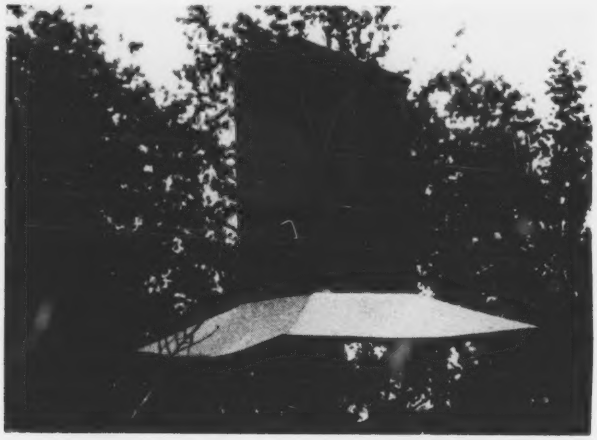
General Description:

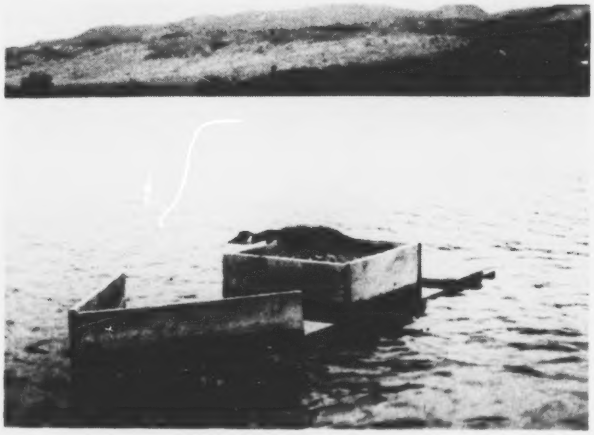
The particular design and placement of nesting structures and boxes often determines which wildlife species will use the structure. *See Cooperative Extension agent or wildlife specialist for specific designs of nest boxes and other artificial nesting structures.*

Boxes: Some species have to nest in cavities that they don't excavate themselves. If natural cavities are not available, artificial cavities (nest boxes) can be used.

Each species needs a certain kind of cavity (diameter of hole, depth, area, etc.) in a certain location (field, woods, water, etc.) and at a certain height (4 feet to 20 feet high).

Platform: Species such as the red-tailed hawk build nests in large trees or other structures above the ground. If nesting sites are scarce, artificial platforms placed on poles above the ground may be used.





Structures: Canada geese and mallards will also use platforms if they are placed near water. In wetlands dominated by open water and lacking islands or peninsulas, floating nest structures are often used by Canada geese and mallards.

Effect on Habitat:

- **In Wooded Areas:** Boxes are especially useful in woodlands in stage 5 succession, or where trees are not old enough to provide cavities.
- **In Open Areas (Stages 2, 3, and 4):** Always useful unless an abundance of nesting cavities or locations already exist, such as hollow fence posts, isolated den or nesting trees, etc.
- **In Wetlands:** Provides secure nesting sites in areas lacking islands, peninsulas, or tall, dense vegetation.

17. Plant Food Plots (1/8 to 2 Acres)

General Description:

Strips can be long and narrow (300 to 400 feet long and 15 to 20 feet wide) or square blocks and preferably located at the edge between two or more kinds of habitat (such as between woodland and hayfield). Best if located next to natural cover such as shrubs, etc. Should be planted prior to June 1 (except for grass-clover mixture) to ensure maturity.

Where possible and in regions with heavy and drifting snow, plots should be square (1 acre minimum) and located near cover on the downwind side. Plots should be located such that nearby shrub and tree cover does not encourage snow to drift into them. Must be protected from livestock.

Food plots include the planting and temporary flooding of Japanese millet in wetlands to provide food for waterfowl. Japanese millet plantings are often larger than 2 acres and used most often in the warmer regions of the United States.

Effect on Habitat:

- **Annual Food Plots - Usually Grains:** Useful in areas of natural plant succession where row-cropping (corn, soybeans, grain sorghum, small grains, etc.) is scarce. One small (1/8 to 1/4) acre plot per 15 acres or large (1 to 2 acres) plot per 60 acres.
- Provides food for many species of wildlife.
- **Perennials - Usually Grasses and Clover or Other Forbs:** Useful in areas of row-crop farming (corn, soybeans, grain sorghum, small grains, etc.) especially where shrub field borders are scarce. Useful in most areas with absence of stage 3 succession.
- Provides both food and cover for many species of wildlife.

18. Plant Grass and Legumes

General Description:

Plant large fields of grasses and legumes. Field size between 2 and 40 acres.

Effect on Habitat:

- Smaller fields are useful for wildlife in wooded areas with little acreage in stages 2 and 3.
- Larger fields are useful in areas with little acreage in hayfields, pastures, or small grains that are used by some wildlife species for winter survival, nesting, or roosting cover.
- These fields will be used for food as well as cover by many species.
- To increase the value for wildlife, these plantings should be grazed, burned, or mowed occasionally (once every 3 to 5 years) to prevent deterioration of the vegetation.

See Cooperative Extension agent for planting recommendations.

19. Plant Mast Trees

General Description:

Mast means seed or fruit which provides food for wildlife. For the purpose of this handbook, mast trees are defined as those trees which produce an annual crop of acorns or other nuts. Mast trees such as sawtooth oak produce an abundance of mast and they may be a desirable supplement to plant for wildlife. Plant mast trees in early spring when they are still dormant.

For specifics about what, when and how to plant, see your local Cooperative Extension agent or Soil Conservation Service office.

Effect on Habitat:

- Especially useful for deer, squirrels, turkeys, and wood ducks in areas with little available mast, such as large expanses of farmland, pine woodland, field borders, urban areas, etc.

20. Plant Trees or Shrubs

General Description:

When properly located, shrubs and trees can benefit many species of wildlife.

Fruiting shrubs and small evergreen trees are especially good for urban areas, fencerows, hedgerows, odd-areas, property boundary markers, and other idle land plantings. It may also be desirable to plant large trees and willows in some areas.

In dry regions, irrigation or water harvesting is often needed to grow shrubs and trees.

In large open areas, multi-row plantings of at least 15 rows of trees and shrubs are beneficial, especially if planted adjacent to tall herbaceous cover or a good food source. It is best to plant shrubs and trees in the early spring when they are still dormant.

For specific information on when, how, and what to plant, see your local Cooperative Extension agent or Soil Conservation Service office.

Effect on Habitat:

- Useful along fences in areas where field borders (such as fencerows) are scarce.
- They are especially useful to make travel lanes for wildlife to move safely across open fields between two areas of cover.
- Also useful along the edges between fields and woodlands, around farm homesteads, and urban areas.
- Can be a valuable practice used to restore and improve riparian areas.

21. Ponds/Lakes Artificial Reefs

General Description:

Large rocks can be piled together, or brush (used Christmas trees are good) weighted down and submerged to provide cover for fish.

This practice is recommended for ponds or lakes that are larger than 10 acres. In smaller bodies of water artificial reefs may allow prey fish (bluegill, etc.) to be overly successful at avoiding predators. This can lead to an overabundance of prey fish that are in poor condition. Structures are usually placed on the ice during winter and allowed to sink. Be cautious about thickness of the ice.

22. Ponds, Clear Muddy Water

General Description:

You can clear muddy water in any of these ways:

Broadcast agricultural gypsum on the pond surface at the rate of 12 to 25 pounds per 1000 cubic feet of water (500-1000 pounds per acre-foot of water).

Broadcast hydrated lime on the pond surface at 20 to 40 pounds per acre-foot of water.

Broadcast agricultural limestone on the pond surface at the rate of 500 to 1000 pounds per surface acre.

Dissolve aluminum potassium sulfate (commercial alum crystals) in water and spread on the entire surface at the rate of 5 to 15 pounds per acre-foot of water.

Broadcast cottonseed meal on the pond surface at the rate of 100 pounds per acre.

Effect on Habitat:

- Removes silt in the water, allowing sunlight to reach phytoplankton.
- This reactivates the first step in the pond food chain.
- At the same time, any erosion of the watershed (which may have caused the muddy water) must be stopped.
- Carp may also be the cause of muddy water. Poisoning (see Practice 32) or drainage may be necessary for pond rehabilitation.

23. Pond Construction

General Description:

This practice should be recommended for creating new ponds and wetlands with permanent water.

Dams and dikes can be used in natural drainages to create ponds and wetlands with *permanent* water for use by fish and wildlife.

When this practice is recommended, it is implied that adequate water control structures will be included and should not be an additional recommendation.

The design varies, depending on the purpose for constructing the pond and the region it is constructed in. For example, steep sloping sides benefit fish and gentle sloping banks benefit waterfowl.

See the Cooperative Extension agent or local Soil Conservation Service office for design details.

24. *Small Dikes, for Temporary Flooding*

General Description:

Only recommend this practice in existing wetlands or potential waterfowl feeding and nesting areas when appropriate.

Small dikes are used to *temporarily* flood (usually in the fall) feeding and nesting areas for waterfowl. Grain fields, Japanese millet plantings, and stage 5 and 6 hardwood woodlands are examples of feeding areas flooded to attract waterfowl. Temporary flooding is also used to improve existing wetlands as nesting habitat for some wildlife such as the redhead, and to control the growth of aquatic vegetation.

When this practice is recommended it is implied that adequate water control structures will be included and should not be an additional recommendation.

25. *Ponds, Deepen Edges*

General Description:

Usually used to improve ponds for fish. To deepen pond edges, draw the water down, let banks dry out, and use a tractor with blade.

Edges should be deepened to a minimum of 2 to 3 feet with steep side slopes.

Soil removed from the edge can be piled around the bank and then smoothed out and planted to grass and legumes.

Effect on Habitat:

- Needed to reduce rooted aquatic vegetation around the edge of a pond.

26. *Ponds, Determine Balance*

General Description:

Population balance is first established in a farm fish pond by stocking the correct numbers of fish. After the first year, check fish pond balance during the summer months by using a 1/8-inch mesh minnow seine 15 feet long and 3 feet deep. Seine at intervals around the pond by anchoring one end at the bank, pulling the seine straight from the bank to its full length, and then sweeping in an arc back to the bank. Four to five sweeps in an average pond is usually enough.

Balance is determined by comparing age groups, condition, and numbers of bass and bluegill and/or trout caught in the seine. Recent reproduction of both bass and bluegill in the seine indicate that the fish population is balanced.

Trout do not often reproduce in ponds, so overall health of the fish is used as an indicator of pond balance. Growth rate, body condition (fat, skinny, size of head in relation to body, etc.), and evidence of disease are good indicators of pond balance.

27. Ponds, Diversion Ditches

General Description:

Diversion ditches should be constructed so that a small amount of water enters the pond and exits the spillway. The bulk of water is diverted around the pond through the diversion ditch.

Effect on Habitat:

- Needed for ponds with too much water flowing through them. Too much water dilutes and wastes fertilizer, and requires expensive water control structures for managing the water flow.
- Used to protect ponds from flood waters.

28. Ponds, Fertilize

General Description:

This practice is generally not used in the western regions of the United States.

Well-fertilized ponds can produce up to three times as many pounds of fish as unfertilized ponds.

Start fertilizing fish ponds in the spring when the water temperature is above 60 degrees Fahrenheit. Apply at the rate of 40 pounds of 20-20-5 (or its equivalent) per acre at two-week intervals, or until a good color develops in the pond. Place the fertilizer in water less than 6 feet deep. Make additional applications of 1 bag of fertilizer per surface acre every 3 to 4 weeks, or when the water clears (becomes less green) so that you can see deeper than 15 inches into the water. Continue this program until water temperatures drop below 60 degrees Fahrenheit in the fall.

If a pond has been properly fertilized for the past 5 years and if there is no concentration of weeds, fertilize in the future with phosphate only. The rate is 40 pounds of super-phosphate per acre per application. Make the first 3 applications 2 weeks apart, and at 3 to 4 week intervals thereafter. Fertilizer may be broadcast by boat or from the bank or distributed from a fertilizer platform.

Effect on Habitat:

- Needed in balanced fish ponds with water clear enough so that a white object can be seen at 15 inches deep.
- Fertilizer in ponds stimulates phytoplankton production, which is the first step in the food chain of a balanced fish pond.

29. Ponds, Remove Trees Near Dike

General Description:

Roots of trees growing on the dam will loosen the soil compaction and cause leaks.

This practice is needed anytime trees occur on the dam or when trees occur around more than 1/3 of the remaining pond bank.

Improves the pond's capability to hold water, and cleans pond banks for use by doves.

Effect on Habitat:

- Trees growing around the pond will reduce the water level.
- Some species (such as doves) prefer clean banks for watering.
- Some nearby trees are desirable for many wildlife species, but need not occupy more than 1/3 of the pond bank.

30. Ponds, Repair Spillway

General Description:

Needed if spillway in existing dam or dike is eroding or otherwise damaged, keeping the pond water level too low.

31. Ponds, Reseed Watershed/Filter Strips

Effect on Habitat:

- One method of reducing erosion in the watershed.
- Reduces silt in pond water and allows sunlight to reach phytoplankton.
- Improves water quality and provides nesting, brooding and winter cover for some wildlife.

32. Ponds, Restock

General Description:

Restock only after all fish in pond are removed, either by draining pond or applying rotenone.

Rotenone kills fish by interfering with the gills' ability to use oxygen in the water. It is applied as a liquid or powder during early fall. Bluegill fingerlings are then stocked in the late fall, and bass fingerlings are stocked the following June. Trout fingerlings are usually stocked in the spring.

Present stocking rates are 500 bluegill and 50 bass per surface acre, or 300 to 500, 2 to 4 inch fingerling trout per surface acre.

Trout are not often stocked with bluegill and bass.

As many as 50 channel catfish fingerlings per acre may also be stocked at the same time as the bluegill.

Effect on Habitat:

- The techniques of draining or rotenoning ponds allow unbalanced fish populations to be removed and new ones started with an exact ratio of bass to bluegill, or appropriate number of trout.
- Needed in ponds with extremely unbalanced fish populations:

Overabundance of small, stunted bluegill or trout.

Few hard-to-catch fish of usable size.

Presence of wild fish such as carp, shad, goldfish, suckers, crappie, green sunfish, or bullhead catfish.

33. Ponds, Stop Leaks

General Description:

Leaks in existing ponds may be stopped with:

Bentonite at 100 pounds per 100 square feet.

Salt at 16 to 20 pounds per 100 square feet.

Tetrasodium pyrophosphate at 2 tons per acre.

Soda ash at 5 tons per acre.

In severe cases, plastic sheeting may be used.

Effect on Habitat:

- Necessary in leaking ponds with limited water supply.

34. Ponds/Wetlands, Provide Shallow Water, Islands, Peninsulas

General Description:

To increase emergent aquatic vegetation and/or provide islands and peninsulas for wildlife. This practice can only be recommended for existing ponds and wetlands. *Not recommended for areas with moving water such as rivers and streams.*

Draw the water down, let the area dry out, and use a tractor with a blade and front end loader. Soil can be gathered from nearby sources or pond/wetland bottom and used to build islands, peninsulas, and shallow water areas (less than 2 feet deep). *Areas above the water line that are disturbed by this activity should be smoothed and planted to grass and legumes.*

Effect on Habitat:

- Needed to increase nesting areas and emergent aquatic vegetation.

35. Roosting Platforms/ Perching Poles

General Description:

Some wildlife species roost or nest in trees or tall shrubs to avoid danger from predators and/or search for food on the ground below. If sufficient trees or tall shrubs are not available, artificial platforms covered with brush or perch poles can be useful.

The particular design and placement of roosting platforms and perch poles often determines which wildlife species will use the structure.

See Cooperative Extension agent or wildlife specialist for details on specific designs and placement of these structures.

Effect on Habitat:

- Useful in open areas that lack roost or perch sites.

36. Root Plowing

General Description:

A large winged plow is pulled under the ground by bulldozers to cut the roots of shrubs. It is usually used in combination with herbicide treatments and grass plantings to convert (usually temporary) mesquite shrublands into grasslands. *Although this tool has many uses, for the purposes of this handbook it will be used only in the Prairie Brushland and Woodland Regions found in Texas to manipulate mesquite shrublands.*

Effect on Habitat:

- Stage 4, when combined with other treatments, reverts succession to stages 2 or 3. Removes competition of some kinds of shrubs allowing grasses and forbs to grow better.

- Sometimes keeps vegetative succession in stage 4. Maintains low dense shrub growth by encouraging resprouting.

37. Streams, Determine Balance

General Description:

Seining is usually not effective for collecting fish in streams. Fish in streams are usually collected using a fishing rod or are electroshocked.

Electroshocking involves running a small electrical current between two rods. The rods are moved up and down the stream and fish that are between the rods are stunned and float to the surface.

The fish are collected in a net and the age, condition, and numbers are recorded to determine the stream balance. The fish are then revived and returned to the stream.

38. Tillage, Delay in Spring

General Description:

Stubble of small grain (wheat, barley, and oats) can be left standing until after nesting season on fallow ground. Fallow ground is ground that is left to rest (no crop planted) for a growing season.

Effect on Habitat:

- Provides undisturbed nesting cover for many species of birds.
- Provides some grain for wildlife food.

39. Tillage, Eliminate in Fall

General Description:

When tillage is necessary, inversion tillage (soil is turned over and covers up crop residue) such as mold board or disc plowing should be avoided. Tillage implements such as chisel plows and rod weeders can be used to do tillage operations without turning the soil over.

Effect on Habitat:

- Provides waste grain as a food source used by many species of wildlife.

40. Timber Harvest, Clear-cut

General Description:

A type of timber management where all trees are harvested at the same time on a tract of land. Different tracts are cut each year and rotated over an area like a checkerboard.

In general, tracts should not be over 40 acres in size, and often tracts as small as 10 to 20 acres are preferred. They should be long and narrow with irregular shapes. The increased sprouting of shrubs, grasses, and forbs that result from sunlight reaching the forest floor is beneficial to several wildlife species. Many wildlife species also prefer the edge between forest and openings created by such cuts.

This practice can be harmful to wildlife species that need woodlands to supply all of their welfare requirements such as red squirrels, woodpeckers, etc. But again, if harvested tracts are not too large and there are sufficient amounts of surrounding forest, these species should remain.

Effect on Habitat:

- Useful in large forested areas with very little acreage in stages 2, 3, and 4, of succession. Reverts stages 5 and 6 to 2, 3, and 4, with more emphasis on stage 4.
- At least 3 to 4 den and/or large mature trees per acre should be left in areas protected from wind which could topple trees.

41. Timber Harvest, Selective Cut

General Description:

Also called "all-aged management." Only selected trees are cut, a few at a time. Stands managed this way have trees of all ages.

This benefits many different species of wildlife. Animals preferring stages 2, 3, and 4 of succession benefit from the sprouting of shrubs, grasses, and forbs where individual trees were cut, yet mature trees are also present for species which prefer stages 5 and 6.

Effect on Habitat:

- Stimulates shrub, grass, and forb understory production in woodlands due to removal of large tree crowns which would otherwise cause shading.
- Also stimulates growth of mast-producing and other surrounding trees.
- At least 3 to 4 den, old mature, and large dead (snags) trees per acre should be maintained.

42. Water Control Structures

General Description:

Various structures made out of concrete, pipes, wood, etc., are useful to control the water level in wetlands and ponds.

They usually are combined with dams and shallow dikes for water control.

Recommend only when inadequate structures are present on an existing dam or dike.

For specific designs on such structures see the local Soil Conservation Service office.

Effect on Habitat:

- Allows management of water levels to increase or decrease the amount of aquatic vegetation. Useful for creating a desirable mix (interspersion) of open water and aquatic vegetation.
- Can be used to manage the quality of water in the pond or wetland and for control of unwanted fish.

43. Water Developments for Wildlife

General Description:

You can provide drinking water for wildlife and livestock in these ways:

- **Guzzlers:** Built by covering an area with an apron of fiberglass or some other material that sheds rain. The water is collected in a storage tank and slowly released into a trough from which wildlife can drink.
- **Dugouts:** Large, earthen catchment basins (built with bulldozers, backhoes, or draglines) designed to collect water for use by livestock and wildlife for drinking. They can be designed to collect run-off water from precipitation, or in areas with a high water table, can be filled by ground water. Side slopes should be gentle to provide easy access to the water for wildlife. Are also often used by waterfowl for resting and brood habitat.
- **Catchment Ponds:** Earthen dikes are constructed to retain water (usually run-off water from precipitation) in natural drainage areas. Placement of the dike is critical to avoid damage by floods, and also have the ability to collect sufficient water. Also used by waterfowl for resting and brood habitat.
- **Windmills:** A well is drilled in the ground and the windmill is used to pump water out of the ground and into a watering trough. The trough should be designed so wildlife can use it without danger of drowning.
- **Spring Developments:** Water seeping out of the ground or near the ground surface is collected in perforated pipe and put in a watering trough. This practice is feasible only in areas that have springs.

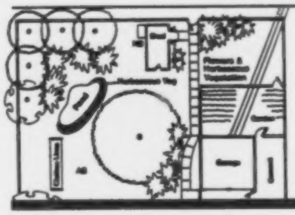
Windmill

- **Birdbaths and Backyard Ponds:** Small ponds can be constructed in backyards and other urban areas to provide water for a variety of wildlife. Birdbaths are also useful for providing water in urban settings.

Guzzler

Dugout

Catchment Pond



Activities

The following pages contain information about and examples of the various judging activities. The activities can be modified for local and state contests and it may be desirable to use only a few of them depending on the ability of participants. In the national event, contestants will be expected to participate in all five activities presented in this handbook. The five activities are presented in the following order:

Activity I.	**Identifying Common Wildlife Foods.**
Activity II.	**Interpreting Wildlife Habitat From Aerial Photographs.**
Activity III.	**Prescribing On-site Habitat Management Recommendations.**
Activity IV.	**Developing a Rural Wildlife Management Plan.**
Activity V.	**Developing an Urban Wildlife Management Plan.**

Scorecards very similar to the ones shown for the Foods, Aerial Photographs, and Management Practices activities will be used in the national event.

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Activity I

Identifying Common Wildlife Foods

Pages 98-101 have a list and tables of foods commonly used by certain wildlife species or groups. The list is not entirely complete as most species of wildlife occasionally eat unusual things if they happen upon them by chance. All species in a certain wildlife group do not eat all foods listed for that wildlife group. For example, all turtles do not eat fruit. Some species eat fruit and not mussels, and others eat mussels and not fruit. Likewise, wildlife does not eat all species in a certain food group. For example, deer do not eat tender twigs and leaves from all trees and shrubs - only certain species.

For purposes of judging, if any species in a wildlife group commonly eats any species in a food group, the food group should be marked for the appropriate wildlife group.

An example of the scorecard for **Activity I** can be found on page 102. This activity is **worth 15 points** in the National Invitational.

In a judging event, each food item shown is assigned a number. The participant marks an "X" in the appropriate box for each wildlife group that may eat the numbered food item. During an event, food items may be shown to contestants with pictures, plant parts, growing plants, or mounted specimens and/or live animals.

Example:

The judge has brought a persimmon tagged with the number 7. This would be classified as a fruit, so the appropriate box for each wildlife group that eats fruit should be marked with an "X" in the column numbered 7. Boxes for bluebirds, deer, foxes, marten, quail, rabbits, sparrows, squirrels, thrashers, turkeys, turtles, and woodpeckers should be marked. To verify, check the tables on pages 100 and 101. All species of turtles do not eat fruit. But remember, if any species of turtle eats fruit, column 7 should be marked for turtles.

Example - List of Wildlife Foods

Bass:	Fish, frogs and salamanders, turtles, snakes, crayfish, insects, earthworms, small mammals, spiders.
Bats:	Insects.
Beaver:	Bark, twigs and leaves, forbs (greens), aquatic plants (roots).
Bluebirds:	Seeds, fruit, insects.
Bluegill:	Insects, earthworms, spiders.
Butterflies:	Nectar from flowers.
Deer:	Tender leaves and twigs, buds, nuts, lichens, ferns, forbs (greens), fruit, mushrooms, grain, grass, bark.
Doves:	Grain, seeds.
Ducks:	Nuts, grain, insects, seeds, aquatic plants (seeds, leaves, bulbs, and tubers), snails, crayfish, frogs, salamanders, earthworms, fish.
Foxes:	Insects, deer carrion, birds, fruit, small mammals (rats, mice, and rabbits).
Frogs:	Insects, earthworms, spiders, crayfish, snails, other frogs, turtles, snakes.
Grouse:	Leaves and twigs, buds, insects, seeds, forbs (greens).
Hawks:	Insects, frogs and salamanders, snakes, lizards, birds, crayfish, small mammals (rats, mice, rabbits, squirrels).
Lizards:	Insects, spiders, other lizards, snakes, scorpions, birds, eggs, snails, small mammals (mice).
Marten:	Small mammals, birds, insects, fruit, frogs, fish.
Mink:	Small mammals, birds, fish, crayfish, insects.
Moles:	Insects, earthworms, snails.
Otter:	Fish, crayfish, birds, frogs, salamanders, mussels, small mammals.
Owls:	Birds, insects, snakes, small mammals (mice, rats, rabbits, shrews, moles, opossums, foxes).
Pronghorn:	Leaves and twigs, buds, forbs (greens), grass, grain, seeds.
Quail:	Forbs (greens), fruit; grain, insects, seeds, nuts, spiders.
Rabbits:	Forbs (greens), fruit, bark, grain, buds, grass, leaves and twigs.
Salamanders:	Earthworms, snails, insects, centipedes.
Shrews:	Insects, snails, earthworms, salamanders.
Snakes:	Insects, birds, eggs, other snakes, fish, frogs, earthworms, small mammals (mice, rats), turtles.
Sparrows:	Insects, seeds, spiders, forbs (greens), buds, fruit.
Squirrels:	Nuts, seeds, buds, mushrooms, fruit, grain.

Thrashers:	Seeds, insects, spiders, fruit.
Trout:	Insects, snails, crayfish, small fish, earthworms, spiders.
Turkeys:	Nuts, tubers, forbs (greens), seeds, insects, fruit, snails, centipedes and millipedes, grain, spiders, buds, grass.
Turtles:	Aquatic plants, fruit, mussels, forbs (greens), fish, crayfish, insects, spiders, carrion.
Wapiti (Elk):	Grass, leaves and twigs, buds, forbs (greens), bark, mushrooms.
Warblers:	Insects, spiders.
Woodpeckers:	Insects, fruit, spiders, lizards, seeds, grain, frogs, nuts.
Wrens:	Spiders, insects.

Wildlife Foods

(table 1)

Foods / Wildlife	Bass	Bats	Beaver	Bluebirds	Bluegill	Butterflies	Deer	Doves	Ducks	Foxes	Frogs	Grouse	Hawks	Lizards	Marten	Mink	Moles	Otter
Aquatic Plants			X						X									
Bark			X				X											
Birds										X			X	X	X	X		X
Buds			X				X					X						
Carrion										X			X					
Centipedes and Millipedes																	X	
Crayfish	X								X	X	X		X			X		X
Earthworms	X				X				X		X						X	
Eggs					X					X				X	X	X		X
Ferns							X											
Fish	X								X				X			X		X
Forbs (greens)			X				X					X						
Frogs and Salamanders	X								X	X	X		X		X	X		X
Fruit				X			X			X		X			X			
Grain							X	X	X			X						
Grass							X					X						
Insects	X	X		X	X				X	X	X	X	X	X		X	X	
Leaves and Twigs			X				X					X						
[illegible]							X											
Lizards										X			X	X				
Mammals (small)	X									X			X	X	X	X		X
[illegible]							X											
Mussels																		X
Nectar from flowers						X												
[illegible] worms)							X		X			X						
Scorpions														X				
Seeds				X				X	X			X						
[illegible]	X								X		X			X			X	
Snakes	X									X	X		X	X				
Spiders	X				X						X	X		X				
Turtles	X										X							

Wildlife Foods

(table 1 continued)

Foods \ Wildlife	Owls	Pronghorn	Quail	Rabbits	Salamanders	Shrews	Snakes	Sparrows	Squirrels	Thrashers	Trout	Turkeys	Turtles	Wapiti (Elk)	Warblers	Woodpeckers	Wrens	
Aquatic Plants													X					
Bark				X					X					X				
Birds	X						X											
Buds		X		X				X	X			X		X				
Carrion													X					
Centipedes and Millipedes					X							X						
Crayfish							X				X		X					
Earthworms					X	X	X				X							
Eggs							X		X									
Ferns																		
Fish							X				X		X					
Forbs (greens)		X	X	X				X				X	X	X				
Frogs and Salamanders						X	X											
Fruit			X	X				X	X	X		X	X	X		X		
Grain		X	X	X					X			X		X				
Grass		X		X														
Insects	X		X		X	X	X	X		X		X	X			X	X	
Leaves and Twigs		X		X					X			X		X				
Lichens																		
Lizards	X																	
Mammals (small)	X					X												
Mushrooms																		
Mussels													X					
Nectar from flowers																		
Nuts (including acorns)			X															
Scorpions																		
Seeds			X	X				X	X	X		X				X		
Snails																		
Snakes	X																	
Spiders			X					X		X	X	X	X		X	X	X	
Tubers																		
Turtles																		

Activity I Scorecard

Wildlife Foods

(15 points)

Instructions: For each wildlife species below, mark an "X" in the appropriate box for all food items shown which may occur in its diet. Some wildlife species will not eat any of the food items shown.

Food Items

Wildlife	1	2	3	4	5	6	7	8	9	10
Bass										
Bats										
Beaver										
Bluebirds										
Bluegill										
Butterflies										
Deer										
Doves										
Ducks										
Foxes										
Frogs										
Grouse										
Hawks										
Lizards										
Marten										
Mink										
Moles										
Otter										
Owls										
Pronghorn										
Quail										
Rabbits										
Salamanders										
Shrews										
Snakes										
Sparrows										
Squirrels										
Thrashers										
Trout										
Turkeys										
Turtles										
Wapiti (elk)										
Warblers										
Woodpeckers										
Wrens										
Number Answered										
Number Correct										

Score = [(total correct - total incorrect) / total possible correct] X 15

Total Answered__________

Total Correct____________

Total Incorrect__________

Score ______

Activity II

Interpreting Wildlife Habitat From Aerial Photographs

This activity is divided into two parts and is used only for rural areas during the national event. The wildlife species and aerial photographs used in evaluating habitat vary for each region, but the procedures are the same. This section is an example of how this exercise is conducted.

Activity II-A, worth 25 points, involves using aerial photographs to judge the quality of an area of land for different wildlife species. An example of the scorecard that is used for this part of Activity II in the national event is shown on page 109. The contestant is given a list of wildlife species. He then must rank each photograph in relation to habitat needs of these species. The species can be written on the scorecard in the space provided. The photographs are ranked by number from left to right starting with the best for each species on the scorecard. Consider only the area that is outlined. Do not consider surrounding areas. Rank the photographs one species at a time. Then mark an "X" in the box that corresponds to the rankings you gave the photos. Only one box should be marked under each wildlife species. This part is scored using a Hormel system (briefly explained in the Scoring section) to take into account similarities in photographs. The Hormel scoring system is somewhat complicated. County agents familiar with livestock judging can give you further explanation of the system.

When looking at aerial photos, imagine how the countryside would look if you were a bird flying over it. If you have flown in an airplane, you know how it looks. The way a bird or pilot sees land is the way it appears on an aerial photograph. For example, a silo appears round, buildings look like squares or rectangles, woods are rough, and fields are smooth.

When reading aerial photographs, hold them so that shadows of objects fall toward the reader. Otherwise valleys appear as ridges, and vice versa. All objects are small, but you can determine what they are by comparing their size with the size of a known object. Other things that help are tone (shade of gray), shape, and shadow. The length of shadow indicates the height of an object. The tone varies with the seasons of the year, so it's important to know the season when aerial photographs were made.

Most photographs used in judging events are made by the U.S. Government, and the date made is usually in the upper left hand corner. The scale of such photos can vary, but often either 4 or 8 inches on the map equals 1 mile on the ground.

Activity II-B is worth 10 points and involves an oral presentation before a judge, demonstrating a basic understanding of aerial photographs and how to read them. Each participant is required to give oral reasons to a judge for one or more species used in Activity II-A. Participants are told which species so they can make notes while studying the photographs. Oral reasons are limited to five minutes for all species. Reasons should include the order of selection and why the order was chosen. Practice photographs and examples on how to rank them for various wildlife species begin on the following page. The written reasons given in the example are similar to how oral reasons should be presented

Example - Interpreting Aerial Photographs

Using the four aerial photographs found on pages 106 and 107, let's learn how to complete this part of the scorecard.

For American kestrels, the areas would be ranked 2, 3, 4, 1. These birds prefer large open areas in stages 2 and 3 of plant succession interspersed with areas in stages 4, 5, and 6 of plant succession. **Area 2** fits this well. **Area 3** also supplies this type of habitat, but has less area in stage 2 or 3 of plant succession and is rated lower than area 2. **Area 4** has large open areas, but has little interspersion of other plant succession stages and is ranked third. **Area 1** does not have any open areas and thus is ranked last.

Brown thrashers would prefer the areas in the order 3, 2, 1, 4. Thrashers prefer dense shrub thickets. **Area 3** supplies the greatest amount of this type of habitat. **Area 2** has more area in stage 4 of plant succession than either area 1 or 4. Areas 1 and 4 are difficult to judge. In this instance, we would assume there is more shrub cover associated with the woodland area in **Area 1** than what is shown in **Area 4**.

Bluebirds would prefer the areas in the order 4, 2, 3, 1. They like to nest in tree cavities adjacent to open fields and prefer open fields for feeding.

Doves also would prefer the areas in the order 4, 2, 3, 1. Since doves prefer open fields for feeding, this rating order is based on the amount of open fields available.

For cottontails, the area should be rated 2, 3, 4, 1. **Area 2** is preferred because it has nearly the proper ratios of habitat components for rabbits (one-third grassland, one- third cropland, and one-third shrub cover), and they are well interspersed (mixed together). **Area 3** doesn't have enough grass or cropland and too much cover, but it has more habitat variety than area 4. **Area 4** is lacking interspersion but has more habitat diversity (different kinds of habitat) than **Area 1.**

These areas would be rated 1, 3, 2, 4 for gray squirrels, hairy woodpeckers and ovenbirds. This is based simply on the amount of stage 5 and 6 deciduous woodland available.

For bobwhite quail, the areas would be ranked 2, 3, 4, 1 - the same as for rabbits. The reasons are similar in this case. However, in some judging instances, areas may be rated differently for quail than for rabbits. For example, quail do not need quite as much shrub cover as rabbits.

Raccoons would prefer the areas in order 3, 4, 2, 1. **Areas 3** and **4** both have streams which attract raccoons. **Area 3** is ranked ahead of 4 as it has more shrubs and trees along the stream. **Area 2** is ranked ahead of **Area 1** because of the interspersion of areas in different successional stages.

For ruffed grouse, the areas would be ranked 3, 1, 2, 4. Ruffed grouse need successional stages 4, 5, and 6 interspersed together. **Area 3** supplies the greatest amount of this type of habitat. **Area 1** lacks interspersion, but has more stage 5 and 6 vegetation than either 2, or 4. **Area 2** is ranked ahead of **Area 4** because of the amount of stage 4, 5, and 6 vegetation.

For turkeys, the areas would be listed 3, 2, 1, 4. According to the *Wildlife Species* section, turkeys need one-fourth to one-half of their range open, and one-half to three-fourths mature woodland. **Area 3** is preferred because it has roughly one-half the area in mature woodlands, and nearly one-fourth the area is open. **Area 2** is second, as it has both open areas and mature woodland. However, it does not meet the mature woodland requirement as well as area 3. **Area 1** is ranked third because it has more timber than area 4, and more cover in general. Due to the absence of woodland, it is doubtful if **area 4** could support a turkey population.

For deer the area would be rated 3, 2, 1, 4. Deer prefer woodland areas interspersed with areas in various stages of succession. **Area 3** fits this well; it includes 3 stages. Area 3 is ranked ahead of 2 as it has more successional stages and interspersion of the various stages. **Area 2** is selected over area 1 because of the variety of succession it offers. **Area 4** is too open, so **Area 1** is picked third and **4** last.

Wood ducks would prefer the order 3, 4, 1, 2. **Area 3** has ponds and better cover along its streams than **Area 4.** Because **areas 1** and **2** have no ponds or streams, there is no difference between them; therefore, a minimum cut of 1 will be used.

Bass and bluegill would prefer the areas in the order 3, 4, 1, 2. Only **area 3** has ponds. **Areas 3** and **4** have streams, so they are preferred over **areas 1** and **2**.

Aerial Photos

Photo 1 — Area 1

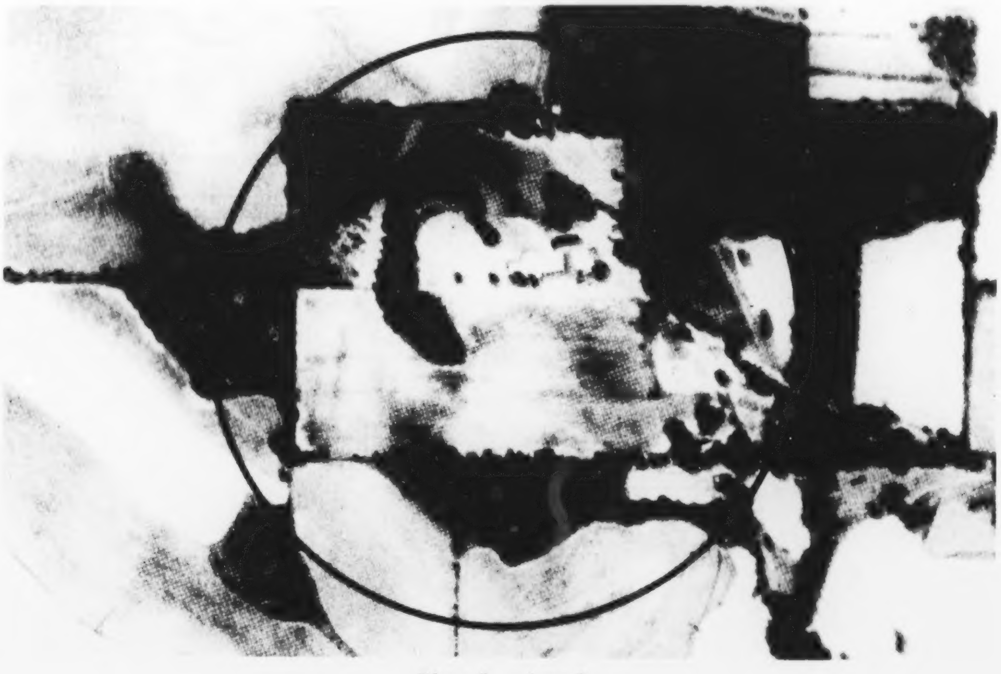


Photo 2 — Area 2

BEST COPY AVAILABLE

Aerial Photos

Photo 3 — Area 3

Photo 4 — Area 4

BEST COPY AVAILABLE

Interspersion

As discussed in the *Concept* section, many wildlife species prefer areas with high interspersion of lands in different successional stages. It is important to consider the amount of interspersion when ranking aerial photographs. One way of measuring the amount of interspersion of an area is to apply the "interspersion index" principle. This can be done using aerial photographs by counting the number of times the habitat changes along an imaginary north-south line across the widest part of the area - then along the widest east-west line. Next add these two numbers together to get an interspersion index value. Compare this value with the other three areas to be judged. The higher the value, the better for quail, rabbits, and other wildlife species that like areas with high interspersion. The interspersion indexes for the four areas shown on the aerial photographs are:

Area:	**Interspersion Index:**
3	18
2	13
4	4
1	0

Activity II Scorecard

***Instructions:** For each species, rank the areas outlined for their habitat value. Mark an "X" in the box with the appropriate ranking for each species. DO NOT consider potential of the area - only its present quality. DO NOT consider surrounding areas - only areas outlined.*

Activity II-A. Habitat Evaluation of Aerial Photographs.
(25 points)

	Wildlife Species							
Ranking	1	2	3	4	5	6	7	8
1 2 3 4								
1 2 4 3								
1 3 2 4								
1 3 4 2								
1 4 2 3								
1 4 3 2								
2 1 3 4								
2 1 4 3								
2 3 1 4								
2 3 4 1								
2 4 1 3								
2 4 3 1								
3 1 2 4								
3 1 4 2								
3 2 1 4								
3 2 4 1								
3 4 1 2								
3 4 2 1								
4 1 2 3								
4 1 3 2								
4 2 1 3								
4 2 3 1								
4 3 1 2								
4 3 2 1								
Score								

Score Activity IIA_____

Activity II-B. Oral Reasons - Aerial Photography
(10 points)

For one or more of the species used above (in activity IIA), you will be required to give reasons why you chose the order of photographs.

Score Activity IIB_____

Total Score Activity II___

Activity III

On-site Habitat Management Recommendations

Activity III worth 40 points, addresses the prescription of *Wildlife Management Practices (WMP's)* necessary to improve an area for each of the wildlife species listed. A blank scorecard is shown on page 112. Space is provided to write in the species and practices (with corresponding numbers) recommended for judging in the *Regions* section of this handbook. If more than one region is being used, copies of the score card can be made. Only practices that are appropriate for the specific contest being administered should be written in the spaces provided.

In urban contests, the following practices and numbers should also be used.

U1. Do not disturb nesting places;

U2. Plant flower;

U3. Rooftop balcony gardens;

U4. Use insecticides carefully.

The practices shown above are not in the *Management Practices* section, but are discussed in the *Wildlife Species* section under the appropriate species. Look at the table on page 41 to see which species these practices may be used for.

Leaders and participants will be informed of the region(s) and species that will be used for any national contest well in advance of the event. The area(s) may be shown to the judging team by an on-site visit or with a series of pictures.

The scorecard for Activity III is completed using information found on the tables in the *Regions* section and from the *Wildlife Species* and *Wildlife Management Practice* sections. The appropriate box for all WMP's that would improve the area for each species listed on the scorecard should be marked with an "X".

Consider each species separately. For example, WMP's for deer would not be the same as those for bluebirds. Prescribe only the appropriate practices that have been listed as applicable for the species. These practices are found in the *Wildlife Species* section or on the Practice table in the *Regions* section.

This activity can be used in both urban and rural areas. Any of the practices can be used in both areas. Prescribed practices in urban areas should not be limited to the urban oriented practices listed above. This is just a list of practices that are more appropriate for urban areas which are not described in the *Wildlife Management Practice* section.

Cost or other land management objectives should not be considered.

Assume that all species listed on the scorecard are present in the area. Also, it must be assumed that the area is large enough to support all listed species.

Example:

Suppose the area we are judging is 30 acres of all stage 6 hardwood woodland in the Eastern Deciduous Forest Region, and turkey is the wildlife species of concern.

By reading about the turkey in the *Wildlife Species* section and looking at the table included with the Eastern Deciduous Forest Region description, we determine that practices 2, 5, 7, 10, 11, 12, 14, 15, 17, 18, 19, 20, 39, 40 and 41 are commonly used for managing turkey habitat in this region. From these practices, select the appropriate ones that will improve the habitat for turkey in the area described above.

We couldn't mark the box for WMP number 15 because we don't know to what extent, if at all, livestock are using the area, or the current condition of herbaceous and shrub layers. Numbers 11 and 12 should not be marked as we don't know the current population condition. We would mark 40 and 41, because there are not openings at present, and according to the requirements of turkey, they need one-fourth to one-half of the area open. For the same reason, we would not mark 19 and 20; there are already more than enough trees for turkey habitat. Once the area is opened by timber harvest, practices 7, 14, 17, and 18 could be applied. So we should mark them. The area is not being farmed, so we should not mark practices 10 or 39. Practices 2 and 5 will likely be needed to manage the clearings, and should be marked. So, with the information given, the boxes marked would be 2, 5, 7, 14, 17, 18, 40, and 41.

Activity III Scorecard

On-Site Habitat Recommendations (40 points)

Wildlife Management Practices (WMP's)	Wildlife Species							
	1	2	3	4	5	6	7	8
Number Answered								
Number Correct								

Score = [(total correct - total incorrect) / total possible correct] X 40

Score_____

Total Answered___________
Total Correct___________
Total Incorrect___________

Activity IV

Wildlife Management Plan

Activity IV is a team effort and is worth 10 points.

Referring to the same tract of land used in Activity III, participants make written recommendations based on the objectives of the landowner as stated on the Field Condition Sheet. As a team, they interpret the objectives, state which wildlife management practices are to be used and how the practices positively or negatively affect the designated species, and tell where these practices can be applied.

No more than one side of a sheet of paper may be used.

An example of a landowner's objectives might be: "I want to manage for both white-tailed deer and bluebirds." We would then identify those management practices that could be used to benefit both deer and bluebirds and discuss where compromises might be necessary.

Field Condition Sheet:

The Field Condition Sheet will contain the following information:

1. Landowner's objectives;
2. Aerial photograph or sketch map of the property;
3. Definition of property boundaries, size of tract;
4. Population conditions for some of the species;
5. Special considerations, which can include costs.

If any of the above are omitted, they are not considered by event organizers to be important to the development of the wildlife management plan.

Activity V

Urban Landscapes
and
Backyard Habitat Plans

Activity V, worth 20 points, is a team effort. It involves evaluating habitats in urban areas, and developing a management map and justification sheet for the recommendations. It should be done in the field, but if inclement weather or other circumstances warrant, the activity may be done indoors using slides or other visual aids.

Introduction:

Most people live in urban areas with intensively managed landscapes around home environments. Rural homes have backyards also that can be managed intensively for animal habitats and wildlife enjoyment. This phase of the handbook enables participants to work near the home to evaluate landscapes.

Species that adapt to human development are selected for this exercise. Habitat requirements provided by the environment are still basic to wildlife survival. Habitat requirements are supplied by vertical layers of short, intermediate, and tall plants as well as by buildings in the area. The horizontal arrangement of lands that are dominated by vegetation and/or buildings of different layers (height) determine which wildlife species might prefer the area. Corridors that enable movement of animals between the different areas are also important features of horizontal arrangement. Remember, buildings in urban areas also serve as places to roost, nest, and hide for some wildlife species.

The Activity:

This is a timed team event. All phases of the exercise must be completed and handed to the judges within 1 hour after the instructions are given and the clock is started.

Equipment Needed Includes:

Compass, acetate sheets, marking pens (not permanent), grid paper, blank paper, and clipboard.

Teams are to develop a wildlife management plan for an assigned urban or backyard area.

The Goals:

The goals for the national contest are to manage four or five of the eight wildlife species or groups on one of the seven categories of urban land. You must work under the environmental conditions of the contest area. At the time of the competition, contest organizers indicate the needs of the landowner for using the area. You should know from information provided at this time whether the wildlife in question is found seasonally or year-round in the area, and you must make management decisions accordingly. Local and state contests should use two or more of the seven categories if no rural lands are visited.

The Products:

The products from this phase of the contest will be a management map with plantings or other management practices drawn to scale, and written justifications about each team's management decisions. The map shall be constructed on one sheet of paper or acetate, oriented to the site, with features of the landscape drawn to scale including your management alterations. Each change you make to the existing landscape must be justified in writing using simple statements about the benefits of proposed management for the wildlife being considered, and how it relates to the landowner's objectives. Any major landscape features left unaltered must also be explained. The judges do not assume that you know whether a habitat is acceptable for wildlife in the present state unless you tell them in your written justifications.

Areas to Evaluate:

Urban landscapes and backyard habitats are broken into seven categories (see Urban Area Description on page 40):

1. Urban forests
2. Corridors
3. Neighborhood parks, school grounds, and golf courses
4. Vacant land and open spaces
5. Residential areas with individual homes
6. Apartment and business lots
7. Inner city

Species:

National events will use appropriate species from the following list:

1. American robin
2. Butterflies
3. Cottontail
4. Eastern fox squirrel
5. Starling
6. Frogs
7. House finch
8. House sparrow
9. House wren
10. Hummingbird
11. Nighthawk
12. Northern flicker
13. Song sparrow
14. Rock dove (pigeon)

As in all other cases, local and state programs can use other species if they are more appropriate.

Landowner Objectives:

Participants are to make recommendations based on the objectives of the landowner as stated on the Field Condition Sheet. No more than one side of a sheet of paper may be used for your written justifications.

An example of a landowner's objectives might be: "I would like to have flickers, cottontails, and robins in the park."

Field Condition Sheet:

The Field Condition Sheet contains the following information:

1. Landowner's objectives;
2. Sketch map of property boundaries and structures that already exist;
3. Scale of sketch map;
4. Special considerations - i.e. do wildlife species use the area only during certain seasons.

If any of the above are omitted, they are not important to the development of the urban wildlife habitat management plan.

Practice Pages:

The example pages that follow page 118 in this handbook are designed for practice at home and at event sites.

The first acetate page is blank and becomes the finished habitat overlay.

The second page is a line grid to be used in establishing the scale of features in your plan, and in communicating this scale to the judges.

The third page represents a hypothetical yard with property boundaries, structures, and vegetation already drawn to scale for you.

The fourth page has symbols for vegetation and other items that may be placed in the yard to provide habitat for wildlife. The tree and shrub symbols are drawn to the same scale as the hypothetical yard, and represent their size at maturity. For areas with different scales, it will be necessary to draw different symbols at the appropriate scale. You can practice on many landscapes with these pages by inserting a blank piece of paper to replace the hypothetical yard, then using the grid and clear acetate to do the work. Be sure to draw with non-permanent markers.

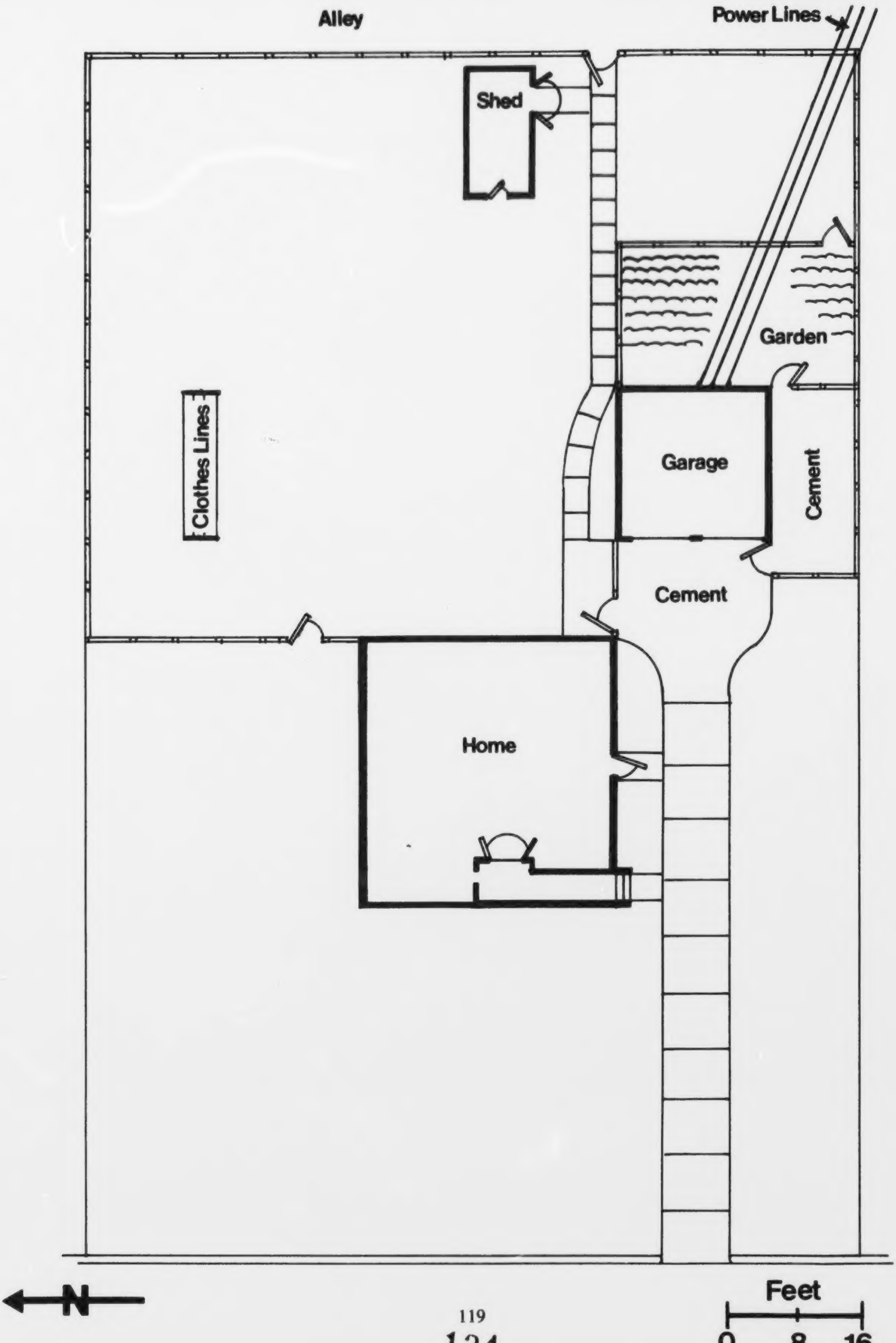
The fifth page is an example of what a finished management plan map for the hypothetical yard might look like. Remember, it is unlikely that areas used in the national or other events will be similar to this hypothetical yard, and the practices illustrated in the example may not be applicable.

Pages 122 and 123 are examples of field condition sheet information (to be supplied to the participant at time of event) and written reasons (the participant must complete during the event) for the completed hypothetical yard management map.

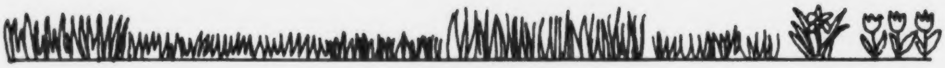
Determine the correct map scale by looking at the size of the area being evaluated. For instance, when a large area such as a park is being drawn, the scale may be as small as 1 square of the grid sheet equals 50 feet. For a small area like a backyard, it may be as large as 1 square equals 1 foot.

The size of existing features in the habitat can be determined by measuring with a tape, pacing off distances, or visual estimation. The most accurate method is measuring with a tape. Features recommended to improve the existing habitat should also be drawn to scale.

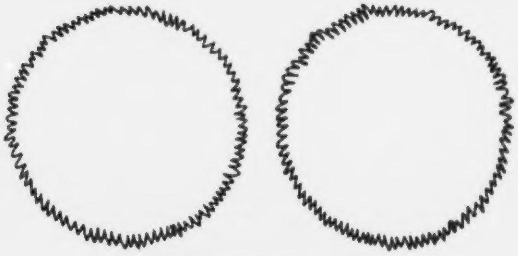
Attention to where planned features are placed in relation to existing features is important. For example, young trees planted too close to buildings can cause problems with building maintenance. In addition, the tree will not grow as well when planted too close to buildings or other trees.


Alley
Power Lines
Shed
Garden
Clothes Lines
Garage
Cement
Cement
Home
N
Feet
0
8
16

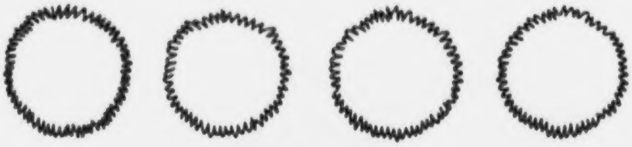
Herbaceous Vegetation [Flowers & Etc.]



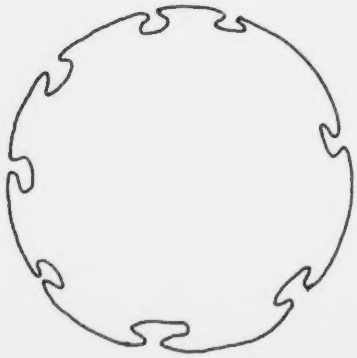
2 to 4ft.H

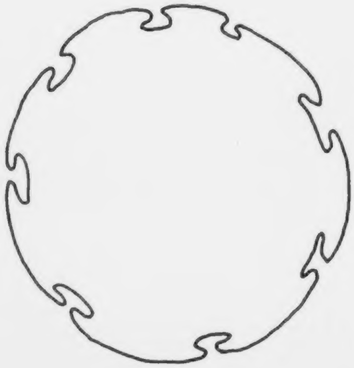


Large Evergreens
75ft.H x 20ft.W

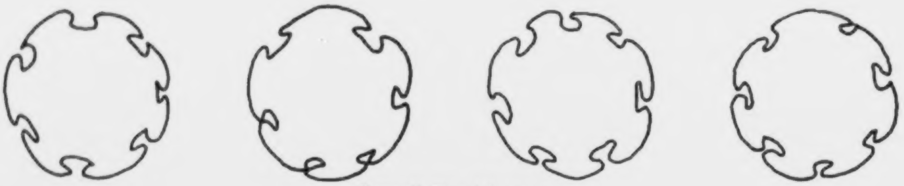


Small Evergreens
25ft.H x 10ft.W

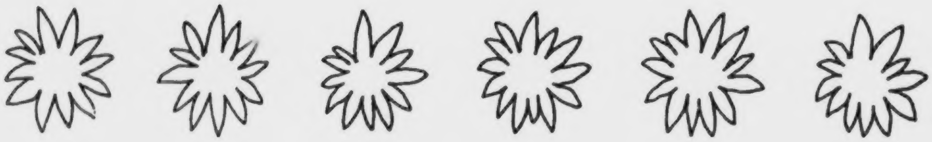




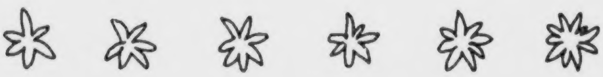
Large Deciduous
75ft.H x 30ft.W



Small Deciduous
20ft.H x 15ft.W

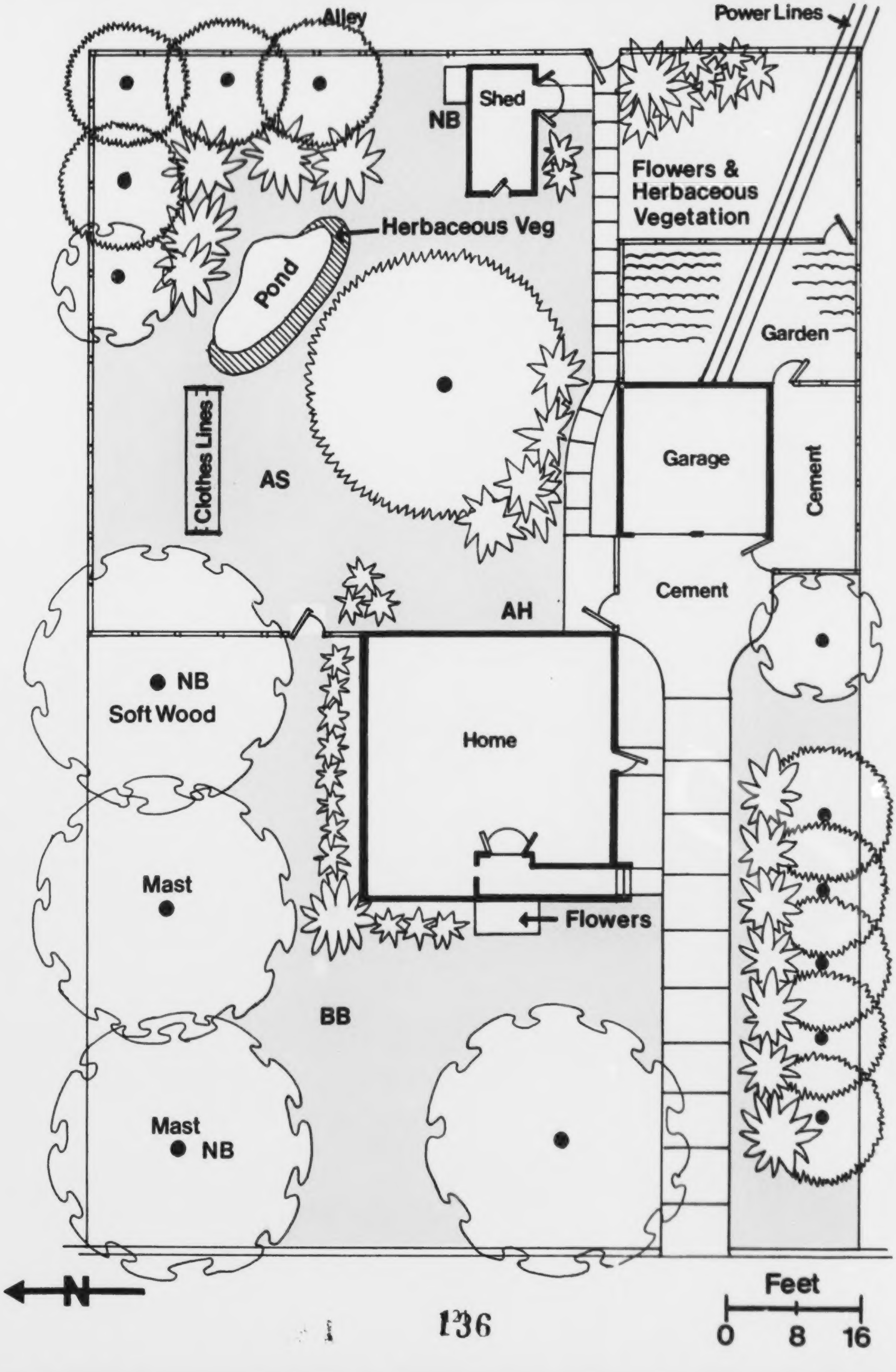


Large Shrubs
10ft.H x 10ft.W



Small Shrubs
5ft.H x 5ft.W

AF-Artificial Feeders for Seeds　BB-Bird Baths　NB-Nest Boxes　AS-Artificial Feeders-Suet
AH-Artificial Feeders-Hummingbirds


Alley
Power Lines
Shed
NB
Flowers &
Herbaceous
Vegetation
Herbaceous Veg
Pond
Garden
Clothes Lines
AS
Garage
Cement
Cement
AH
NB
Soft Wood
Home
Flowers
Mast
BB
Mast
NB
N
Feet
0
8
16

Example-Urban Activity

Participants in the national event receive field condition information similar to the following sample. Also given is an example of how to write reasons for the hypothetical management plan shown on the previous page. Remember this is only an example. Reasons written for other situations would likely be much different and could be more descriptive than those shown here.

Field Condition Sheet

Area: Residential.

Species to Manage: American robins, eastern fox squirrels, frogs, hummingbirds, northern flickers.

Landowner Objectives: Provide some habitat for all of the species listed. Insure that the pond is visible from the house and safe for children.

Written Reasons Example

American Robins: Plant deciduous and small evergreen trees for nesting habitat. Maintain open areas of grass for summer foraging. Plant fruit and berry producing shrubs for fall and winter food. Construct small pond for water. Water not in limited supply, but will attract robins. Locate a birdbath in the front yard, as shown, for the same reason.

Eastern Fox Squirrels: Plant mast and other trees for future food and cover. Put up nesting boxes when large deciduous trees planted in the front yard grow to sufficient size. Pond to supply water during the summer months. Due to the lack of large deciduous trees, it may be over ten years before this yard is sufficient squirrel habitat.

Frogs: Construct small pond. Allow tall, dense herbaceous vegetation to grow along southwest shore of pond to provide cover. Due to the presence of children, the pond water level is not to be over 1.5 feet deep. This is not deep enough for frogs to survive in the winter. Drain pond in the fall, and capture and release all frogs into neighboring ponds that have sufficient water depth.

Hummingbirds: Include flowers such as red petunias and begonias in flower gardens in the front and back yards. Plant flowering shrubs such as honeysuckle and dogwood. The planned tree and shrub plantings should provide sufficient nesting habitat. Locate an artificial feeder filled with honey-water near the house.

Northern flickers: Plant softwood trees for future nesting sites. Place a nesting box on the shed in back yard to provide nesting habitat until trees become large and old enough. Locate a suet feeder as shown on plan map. When the evergreen tree in the backyard attains sufficient size, strap the suet feeder to the tree trunk.

Scoring the Contest

Each activity is scored as follows:

Activity I: The score for this part is based on the formula: [C - I)/T] x 15, where C = the number of correct answers on the contestant's scorecard; I = the number of incorrect answers on the scorecard; and T = the total number of correct answers on the scorecard of the official or judge. For example, a contestant has 38 answers that are correct and 12 that are incorrect. The judges determine there are 44 correct answers, so the contestant's score on this part would be [(38 - 12)/44] x 15 = 8.86. What we have done is create a proportion of the official correct answers that the contestant has listed, and then multiply that by 15, the total number of points allocated for this part. Do not consider the answers that the contestant does not include on the scoresheet. This would be double counting.

Activity II-A: This part involves the correct placing of habitat from aerial photographs for each of the listed wildlife species. The Hormel computing slide is used to score this part of the scorecard. The judge determines the official order of photographs for each of the species, then establishes, by number, the margin of difference between each of the three pairs of photographs. These numbers represent the penalties for switching the top, middle, and bottom pairs. A contestant makes six decisions when he ranks four aerial photographs. The Hormel slide penalizes a contestant, by the amount of the margin between the two photographs involved, for each incorrect decision. Once a total score for this part is computed with the Hormel slide, the score is adjusted to a scale of 0 to 25 points, since the maximum total points for a perfect score for Activity II-A is 25.

Activity II-B: This activity is worth 10 points and is subjectively judged by officials. A contestant gives oral reasons to a group of judges on why he/she ranked the aerial photographs for the species indicated. The reasons should be short and concise. Contestants are given one or two species to consider. Even when an incorrect order for the photographs is selected, it is possible to score well by giving logical and concise reasons.

Activity III: This score is calculated the same way as in Activity I, except the total number of points is 40.

Activity IV: The wildlife management plan is subjectively scored by the judges. Judges look for how well the contestants perceive the needs of the landowner, which WMP's to use, and how well the contestants make compromises for the species the landowner wants to manage. The highest possible score is 10 points.

Activity V: This activity is scored in the same manner as Activity IV. The urban wildlife management plan is subjectively scored by the judges. Judges look for how well the contestants perceive the needs of the landowner, which WMP's to use, if the features drawn on the sketch map are accurate and logical, and how well they can make compromises for the species the landowner wants to manage. The highest possible score on this activity is 20 points.

The team score is calculated by adding Activities I, II, and III for each contestant and dropping the low individual score (if there are four members on the team). The three remaining scores are added and the team scores for Activities IV and V are added to create the total team score. A maximum team score would be 300 points.

Glossary

aerate: to supply or expose water with air to increase dissolved oxygen and release harmful gases.

annual: when referring to plants, those that complete their life cycle from seed to mature seed-bearing plant in one growing season.

arid: dry, receives little precipitation.

broadleaf: a plant with wide blade leaves, such as an oak or cottonwood. Seeds are born from flowering parts in contrast to conifers which bear seeds in cones.

butte: a hill that rises abruptly from the surroundings. The sides are steeply sloped or with cliffs, and the top is nearly flat.

cacti: plants adapted to dry conditions. Often store water in leaves and other parts of the plant. Usually have small leaves and thorns.

canopy cover: the amount of ground covered by the branches, leaves, and stems of plants. Can specify as herbaceous, shrub, tree, or all canopy cover.

canyon: a deep, narrow gap or cleft in the earth caused historically by running water or glaciers.

coastal plain: large, nearly level areas of land near ocean shores.

competition: when two or more organisms use the same resource.

congregate: when animals group together in an area.

conifer: usually refers to needleleaf trees that bear their seeds in cones. Spruces, pines, and firs are examples.

cover: vegetation and other land features that provide areas for wildlife to hide, sleep, feed, and reproduce.

crown-sprout: the ability of some plants to regrow after plant material above ground is removed by fire or other disturbances.

cultivate: tilling or working the soil for the purpose of growing crops and other desired plants.

decadent: declining in health and/or productivity.

deciduous: plants that annually shed their leaves. Usually trees and shrubs.

dense: thick, or crowded closely together.

detrimental: having harmful effects.

dew: water droplets condensed from the air onto cool surfaces such as leaves. Usually occurs at night.

dominant: the plant or animal species that is the most noticeable and common in an area. Often are a controlling force in the community where they occur.

drought: the lack of normal precipitation for an extended period of time. A long period with little or no rain.

endangered species: a species that is in danger of becoming extinct.

environment: the surroundings that affect the growth and development of an organism. The surroundings of an organism, including other plants and animals, climate, and location.

evergreen: plants that do not lose all their leaves at one time. Usually conifer trees, but also some broadleaf trees such as live oak.

excavate: to make a cavity or hole. To hollow out.

exclusion: keeping something out of an area.

fertile: rich in material needed to support plant growth.

fluctuate: to vary, or rise and fall irregularly.

forage: refers to the vegetation eaten by animals.

forb: low growing herbaceous plants, both annuals and perennials.

glaciation: the action of huge masses of moving ice formed from compacted snow.

glean: to gather food in a systematic manner with a minimum of waste and unnecessary effort.

grass: relatively short plants (less than 4 to 5 feet) typically having long narrow leaves and hollow, jointed stems. Flowers are inconspicuous and often in clusters.

ground litter: layer of the forest floor consisting of decaying organic matter such as leaves, branches, and dead plants.

hardwood: deciduous or broadleaf trees.

herbaceous: all grasses and forbs having soft rather than woody stems including flowers and plants called weeds.

herbicide: chemicals used to control the growth of plants.

insecticide: chemicals used to control insects.

Glossary

interior basin: land areas that are generally bowl-shaped and surrounded by hills and mountains. Usually drained by one river system and isolated from ocean influence by mountains and hills.

invertebrate: animals lacking a backbone. Some examples are insects, spiders, mollusks, and crustaceans.

irrigate: to supply cropland, parks, yards, etc., with water through the use of diversions, ditches, and pipes.

legume: plants that bear seeds in a pod. Typically have characteristics that allow them to improve the fertility of the soil. Some examples are alfalfa, clover, soybeans, and peas.

manipulate: manage or influence to achieve desired results.

moldboard plow: a type of plow that turns the soil completely upside down, burying all crop remains underneath. Does not leave crop residue on ground surface.

nutrients: chemicals required for plants and animals to grow and exist.

peninsula: a long, narrow projection of land into water.

perennial: a plant that lives for several years. Having a life span of more than two years.

phytoplankton: microscopic floating and suspended aquatic plants. Are the first step of the food chain in many aquatic systems.

plateau: an elevated, relatively level expanse of land. Sometimes called tableland.

playa: the level area at the bottom of a basin that is often covered with water from rain runoff and snow melt.

regenerate: to replace lost or damaged parts with new tissue.

rejuvenate: to stimulate and return to youthful health and vigor.

riparian: on or near the bank of water areas. The land area that is influenced by the adjacent water.

secluded: removed or screened from view of other areas and disturbances.

sedge: grass-like plant with long narrow leaves, stems are round. Many species like wet areas.

shrub: plants with woody stems that are usually less than 12 feet tall. Often have many main stems rather than one main stem (trunk).

slash: the residue left on the ground after trees are harvested.

slope: the degree that the land surface is inclined.

softwood: usually refers to coniferous trees. Some deciduous trees such as aspen also have relatively soft wood.

species: animals and plants that are the same and successfully reproduce the same kind of plant or animal.

stagnant: sluggish, not producing to potential.

subclimax: a stage in succession that is short of the climax stage, but further development is inhibited from some factor(s) other than climate.

succulent: having thick fleshy leaves that conserve moisture.

terrain: the character or topography of the land.

transitional: the process of changing from one form to another.

tree: a plant that is usually more than 12 feet tall and has a single main woody stem with a distinct crown of leaves.

undulating: a regular rising and falling or side to side motion.

valley: an elongated lowland between mountains, hills, or other upland areas that often has a river or stream running through it.

vigor: in plants and animals refers to the capacity for strong growth and high survival.

waste water: the water that runs off cropland during irrigation.

The American Heritage Dictionary, Second Edition, and Project Wild Elementary Activity Guide, 1986, were the main sources used for development of this glossary.

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Notes

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